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THE EXMOOR STORM OF 15th AUGUST, 1952

A great storm merits the closest attention that can be paid to it. On the one hand it is the plain duty of scientists to study it in all its aspects—its origins, its development, its impact and its consequences—with the object of gaining knowledge that may be put to practical use in mitigating the disastrous effects of future storms when they occur. On the other hand scientists must also sieze the opportunity which a great storm offers to advance their theoretical knowledge. A storm represents in many fields an opportunity to study nature working with an unaccustomed intensity and at a much accelerated tempo. It is as though the conditions of the great natural experiment which field scientists are privileged to observe had been temporarily altered, and it is important that they should discover and record faithfully as much as possible of what occurred during the brief period of altered conditions. Meteorologists, hydrologists, pedologists, ecologists, and geomorphologists are among the specialists concerned, and no doubt the storm which broke upon Exmoor on August 15th last with such tragic consequences for the village of Lynmouth has engaged the attention of all. The meteorological aspects have indeed already been the subject of a first discussion†, and we are glad to publish here two studies that fall properly within the field of the geographer. Mr. Kidson's study is concerned with the questions how much rain fell, where, and in how short a time; how it was discharged by the streams chiefly affected, and with what consequences. Mrs. Gifford's study inquires what was going on on the high moorlands where the sheets of storm water found no adequate drainage ways and either created them *de novo* or, by saturating and overweighting the soil on steep slopes, provoked an astonishing series of minor landslips. Both studies are based on field work carried out as rapidly as possible following the storm and should be regarded as initial surveys which may be followed at some future date by more deliberate analyses.—EDITOR.

I.—THE EXMOOR STORM AND THE LYNMOUTH FLOODS

C. KIDSON*

THE first fortnight of August was exceptionally wet throughout the south-west of England and most areas had received in that time more than a normal August rainfall. Thus Winsford, Somerset, received from 1st–14th August, 4·62 inches as compared to a twenty-five year average of 4·01 inches for the whole month[1]. Even after a comparatively dry summer, this meant that the soil of Exmoor was already saturated so that the very heavy rain of August 15th found its way to streams and rivers with unusual rapidity. The rainfall map (Fig. 1)[2] shows the distribution of rainfall in North Devon and West Somerset on that day.

† A Bleasdale and C. K. M. Douglas, "The Storm over Exmoor on 15th August, 1952," *Met. Mag.*, vol. 81, December, 1952.

* Mr. Kidson is a member of the Staff of the Department of Geography, University College of the South-West, Exeter.

[1] Except for an area north of a line from Norfolk to East Cheshire and then east of the Pennines, the rainfall of the first nineteen days of August exceeded the average for the whole of August, often by large amounts :—

	Rainfall 1st–19th Aug., 1952	Average August Rainfall
Plymouth	6·77 in.	3·00 in.
Douglas	5·33 in.	3·80 in.
Kew	3·30 in.	2·25 in.

[2] The rainfall map which was constructed from some 75 rainfall records, must be treated with reserve in that on the northern slopes of Exmoor, including the Lyns' drainage basin, rainfall records are few in number.

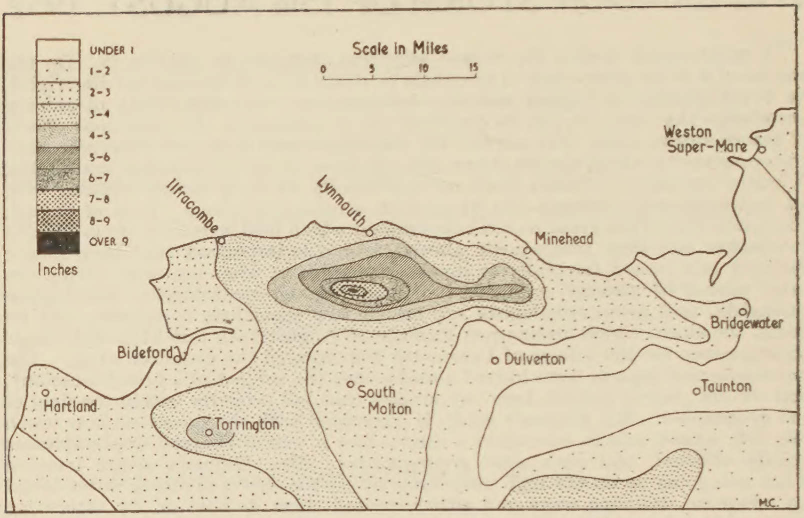

Fig. 1.—Rainfall of North Devon and West Somerset, 15th August, 1952.

Rain was heavy throughout the day from 11 a.m.[3] onwards, but it is estimated that two thirds of the rain fell during the five hours from 8 p.m. to 1 a.m. on the night of the 15th/16th August. During this period a heavy thunderstorm occurred which appeared to be centred somewhere near Longstone Barrow. A figure of 9·1 inches was recorded on an autographic gauge situated on Longstone Barrow, a part of The Chains which forms the watershed of Exmoor. Challacombe recorded 7·58 inches in 24 hours and Honeymead Farm near Simonsbath, 7·35 inches. This tremendous deluge inevitably led to a very rapid rise in all the rivers flowing from Exmoor and, to a certain extent, in those flowing from Dartmoor, particularly those flowing northward. From the evidence of beaten vegetation and soil creep, it would seem that the area of heaviest rain was in the region of Wood Barrow to the east of Longstone (Figs. 1, 2). It is apparent that the area of very heavy rainfall was comparatively restricted, and that the heaviest rain was received by the northern and north-eastern slopes of Exmoor[4].

There was nothing in the weather conditions of the preceding days to make possible any forecast of the heavy rain which fell. A shallow depression centred over the English Channel and northern France on August 14th suggested rain and scattered thunderstorms. The deluge of August 15th clearly reflects a condition of extreme atmospheric instability, the causes of which the Meteorological Office is at present investigating.

The result of the heavy rain was inevitably widespread flooding. All the rivers from Exmoor flooded very rapidly, and the Taw and

[3] All times mentioned are British Summer Time.

[4] Most of the weather records for the Exmoor area mention north-easterly winds of force 1 to 2.

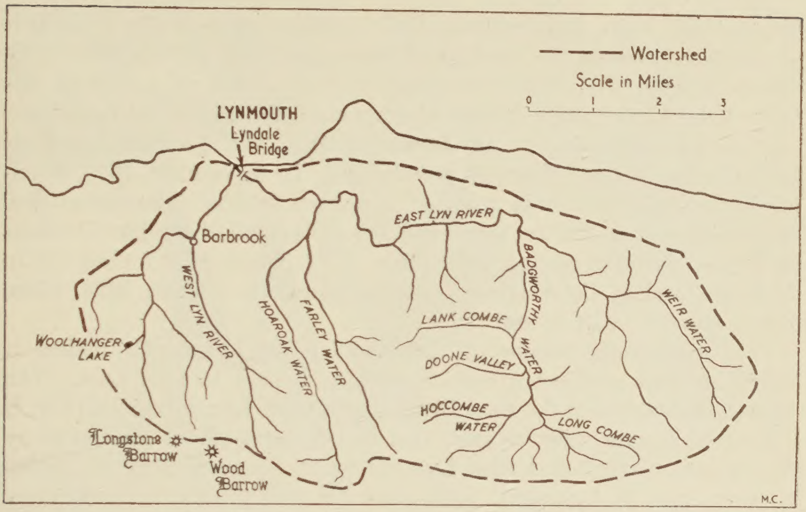

Fig. 2.—The Lynmouth Streams.

the Torridge also rose quickly. Yet this flooding was restricted. At Taunton to the east, no unusual change in water levels was recorded and on south-east Dartmoor, conditions were not abnormal. The area of serious flood damage covered approximately 250 square miles from Dunster and Tiverton to South Molton and Lynmouth, though crop damage and loss of livestock were much more widespread. A characteristic feature of the floods was the unusual rapidity with which they followed the onset of the period of most intense rainfall on the evening of August 15th. By 9 p.m., water from the Lyns was flowing down Lynmouth High Street, and the water rose at a rate of 6 inches every 15 minutes. At Simonsbath on the Barle, the peak occurred shortly before 9 p.m. It reached Withypool at about 10-45 p.m. and Dulverton, where the river was some 20 feet above normal, shortly before midnight. On the Exe, the flood reached Exford, where the river rose about 12 feet, at 9-20 p.m. and Winsford at 11-15 p.m. The normal difference in time between peak floods on the Barle at Simonsbath and Dulverton is of the order of ten hours ; on this occasion, the difference in time was a mere three hours.

The speed with which the flood waters rose and travelled downstream was almost matched by the speed with which they subsided. By midday on Saturday, August 16th, although all rivers were still running much above their normal level, most of the flooding of riverside fields had disappeared. Even on the West Lyn, maximum water level was reached at 10 p.m. on August 15th and by 11 p.m. the level had begun to fall.

The loss of life and damage as a result of this "acute catastrophic flood" (as floods are defined for England) makes it comparable with the worst floods ever recorded in these islands. Twenty-eight deaths, the destruction of seventeen bridges and a vast amount of damage

to retaining walls and roads in Devon alone leads to the inevitable comparison between the flooding of August and that of 29th May, 1920, which affected the little River Lud and the town of Louth at the foot of the Lincolnshire Wolds which caused 23 deaths, and rendered 1,250 people homeless[5]. In January, 1928, the Thames burst its banks in London and fourteen people died. In November, 1925, flooding in the Vale of Conway resulted in sixteen deaths. The exceptional rain which occasioned the Exmoor floods calls to mind similar downfalls at Bruton in Somerset on 28th June, 1917, when 9·56 inches fell in 24 hours, and at Cannington, Somerset, on 18th August, 1924, when 9·4 inches fell in 24 hours.

The disastrous nature of the flooding at Lynmouth makes it inevitable that greatest attention should be paid to that area. The total drainage area of the East Lyn and the West Lyn combined (Fig. 2) is some 38 square miles or just over 24,000 acres (West Lyn slightly over 9 square miles and East Lyn nearly 29 square miles). The two streams unite in Lynmouth and enter the sea jointly. A relatively simple calculation from the rainfall figures shows that some 3,107 million gallons of water fell in the drainage area of the two Lyns and that 905 million gallons of this drained into the West Lyn and 2,202 million gallons into the East Lyn[6].

It is reasonable to assume that, under normal August conditions in the Lyns' area, about one third of the rain falling runs off immediately into rivers or reaches them subsequently as the result of percolation while the remainder, except for that which is " lost " by deep penetration, represents a loss by evaporation. In this instance, when 13 of the preceding 14 days of August had been days of comparatively heavy rain, it is reasonable to assume that a much greater proportion of the rain which fell on August 15th ran off very quickly into the rivers[7] and, if this is the case, the flow figures of the East

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[5] See P. R. Latter in *The Lincolnshire Magazine*, vol. 1, No. 2, pp. 73, November/December, 1932.

[6] These figures must not be thought to be more than carefully considered estimates from the rainfall data, and the scarcity of rainfall observing stations in this area must mean that other estimates will be made which may differ within quite broad limits.

[7] At Simonsbath, where more than 7 inches of rain fell in 24 hours (an unofficial " bucket " record gives 10 inches) the clock in the hotel stopped at 8-55 p.m. in 5 feet of water. This flooding was caused not by the River Barle but by a tiny stream, normally a few inches deep, which joins the river near Simonsbath Bridge.

At Exford, a small stream, normally 4 inches deep, rose to a depth of 2 feet shortly after 9 p.m. Here, 2·37 inches of rain fell between 7-15 p.m. and 9-20 p.m. and 0·77 inches fell between 9-20 p.m. and 9-40 p.m., i.e., 3·14 inches in two hours out of a total for the 24 hours of 4·96 inches.

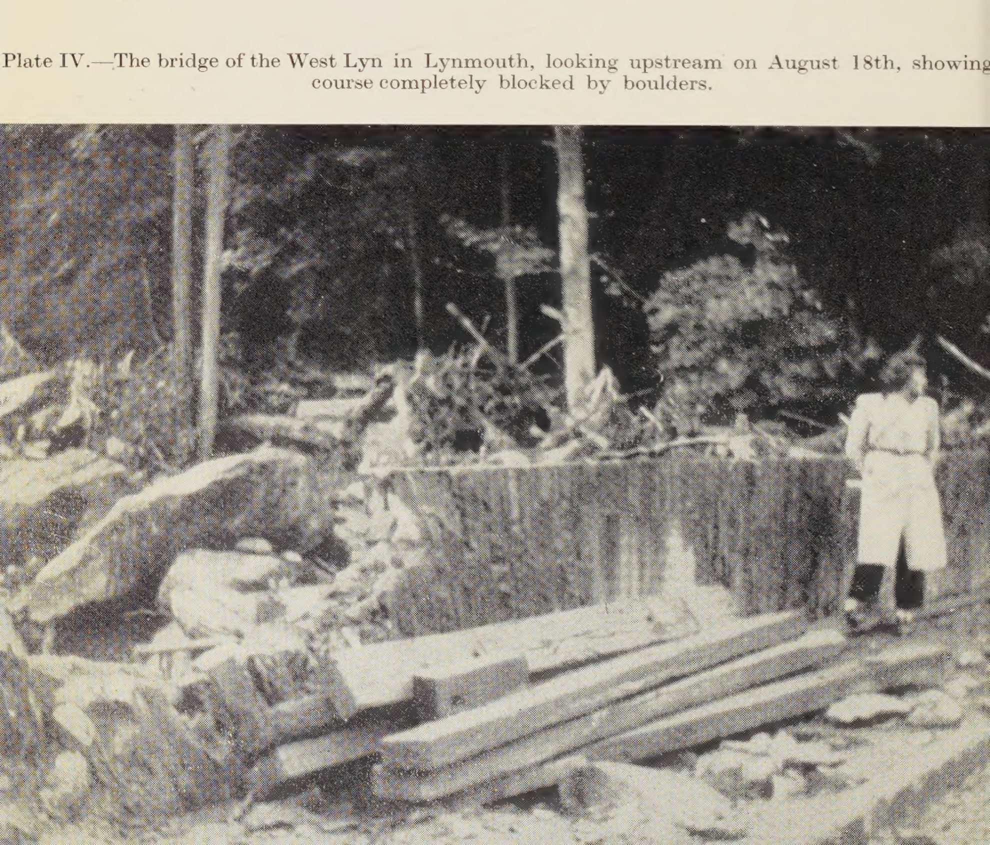
No records are available of inflow into Challacombe Reservoir on Exmoor, but the inflows on Jennett's Reservoir, south of Bideford, and of Crowdy Marsh, on Bodmin Moor, are illuminating. At Jennett's, the water level rose by 30 inches (the equivalent of 8 million gallons) before overflowing late on the evening of August 15th. At Crowdy Marsh, 21 million gallons flowed in from 12 noon on August 15th to 3 a.m. on August 17th. Between 3 p.m. and 9 p.m. on August 15th, the inflow was at the rate of 13 million gallons a day, and this rate was repeated from 6 a.m. to 9 a.m. on August 16th.

I.—The East Lyn looking upstream. Photographed at 3 p.m., August 14th, 1952, from a point 200 yards below Lyndale Bridge which is just out of sight.

II.—The East Lyn looking upstream through Lyndale Bridge at 11 a.m., August 18th. The Lyn can be seen entering from the right by the course it assumed during the flood. Formerly it had joined the East Lyn at a point 35 yards in rear of the camera.

Plate III.—The West Lyn looking downstream on August 18th at the point where diver[illegible] occurred during the flood. The mound of boulders in the left centre marks the former co[illegible] now filled with debris.

Plate IV.—The bridge of the West Lyn in Lynmouth, looking upstream on August 18th, showing course completely blocked by boulders.



and West Lyns are so staggering that the damage which resulted ceases to surprise. No gauges are normally maintained on the East Lyn or the West Lyn, and consequently flow figures can only be arrived at by deduction from rainfall figures, high water marks and cross sectional areas. The rates of flow will probably prove to have been about two-thirds of the maximum possible rates to be quoted below. This figure is arrived at after considering the inflows of several reservoirs in the North and Mid-Devon areas in relation to the rainfalls in their drainage basins. Thus at the reservoir at Darracott Moor, 1½ miles north-east of Great Torrington, it is estimated that in 24 hours on August 15th/16th nearly 7 million gallons flowed in. The drainage area of the reservoir received just over 13 million gallons of water in rainfall. Thus more than half the rain found its way into the reservoir. The rainfall at Darracott was of the order of 3½ inches and it is likely that with the much more intense rainfall in the Lyns' drainage basin, the proportion of the rainfall reaching the rivers almost immediately was as high as two-thirds.

The maximum possible rates of flow, assuming that all the rainfall reached the rivers without loss from evaporation[8] are 3,107 million gallons in 24 hours or approximately 5,770 cusecs (=cubic feet per second)[9]. These are in themselves remarkable figures. They compare with a daily average figure, calculated over a twelve month period, of 1,357 million gallons per day on the River Thames. The record figure for the Thames is given as 19,500 cusecs (or about 10,500 million gallons per day) in December, 1929. If the rate of flow in the Lyns is calculated on the basis of two-thirds of the day's rainfall falling in the five-hour period already mentioned (and this is a conservative estimate) the following short period rates of flow result: West Lyn 5,375 cusecs; East Lyn 13,088 cusecs; the two combined over 18,400 cusecs. This gives the two streams combined *over a period of a few hours* a rate of flow almost as great as the record figure already quoted for the Thames. While, in this connection, it is the period of run-off and not the period of rainfall which is important, the available inflow records of reservoirs in the region suggest that there was only a very small time lag between the rain falling and the water flowing into the reservoirs.

These startling figures must be related to the relief of the areas to which they refer, if one is to appreciate the damage which resulted, and the sheer irresistible force of the torrent which struck Lynmouth. The drainage area of the Lyns consists of gently sloping moors draining to narrow steep-sided valleys. The West Lyn (Fig. 3) and the tributary which reaches it at Barbrook have profiles of great steepness. The East Lyn in its lower course is more mature in form than the West

[8] The loss from evaporation on a day of continuous rain which at times reached great intensity, and of only light to moderate winds, must have been very much below the normal for August.

[9] As a result of a dry July, the Lyns at the beginning of August were very low. They had reached normal summer flow by August 14th. The springs "broke" early in the afternoon of the 15th.

Lyn, for in this section it is, in part, a strike stream and is also, in part, fault guided along the junction of the Foreland Grits and the Lynton Beds. Its tributaries, Badgeworthy Water, Farley Water and Hoaroak Water are similar in character to the West Lyn. All flow from south to north over courses about four miles long, and in this distance they fall some 1,400 feet (Fig. 3). These steep gradients in themselves contributed largely to the tremendous speed of flow which carried away the enormous quantity of water which they accommodated on August 15th. It is clear, in view of its shorter course, that the peak of the flood in the West Lyn must have reached Lynmouth a few minutes before the peak on the East Lyn, although there appear to be no records to this effect. The Devon County Surveyor has estimated that some 40,000 tons of boulders were moved in the flood into the Lynmouth area, and it is apparent, not only from this fact but also from the change of course of the West Lyn in Lynmouth to which so much of the damage there is attributed, that the flow of water was not unimpeded (Plates II, III, IV). It seems to be quite clear that a series of dams, created by fallen trees and boulders, by local landslides and other phenomena, impeded the flow from time to time. The breaching of these dams, which quite possibly occurred successively downstream, must have resulted in a series of surges in which the speed of flow is incalculable. There are several recorded instances of the breaching of existing dams. Woolhanger Lake[10] in the tributary of the West Lyn two miles above Barbrook, a lake of 1½ acres about 20 feet deep containing 1½ million gallons of water, burst its retaining dam at 9-10 p.m. and was followed at 9-15 by the break of the bridge downstream. At about 9-30, the water in the Lyn at Barbrook rose 12 feet in 3 minutes. At Parracombe on the Heddon River, water started to rise at about 9-30. This followed soon after the breaching of a 50-foot earthen dam (the embankment of the old Lynton and Barnstaple Railway), ¾ mile upstream from Parracombe, the culvert through the dam having been blocked by debris. The water passed downstream in a series of waves as the walls of gardens gave way before it.

It is unquestionable that temporary damming effects, probably initiated by the piling of trees and then boulders against bridges, contributed largely to the devastating nature of the floods. In March of this year, a period of a fortnight of exceptional north-easterly gales in the Lynton area resulted in a large number of trees being uprooted, many of which remained in the valley bottoms. The uprooting of trees also occasioned a good deal of crumbling in the river banks, and it would seem that the gales of March set the stage in some degree for the events of August 15th[11].

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[10] This lake probably owed its origin to the activities of John Knight on Exmoor (see *The Land of Britain*, vol. 92, Devon, pp. 516–519, L. D. Stamp).

[11] The bridge across the Barle at Dulverton and the very much larger bridge across the Taw at Barnstaple were both still partially blocked by debris when the flood subsided. This gives an indication of the probable fate of the bridges of much smaller span which were swept away in the Lyn valley and elsewhere.

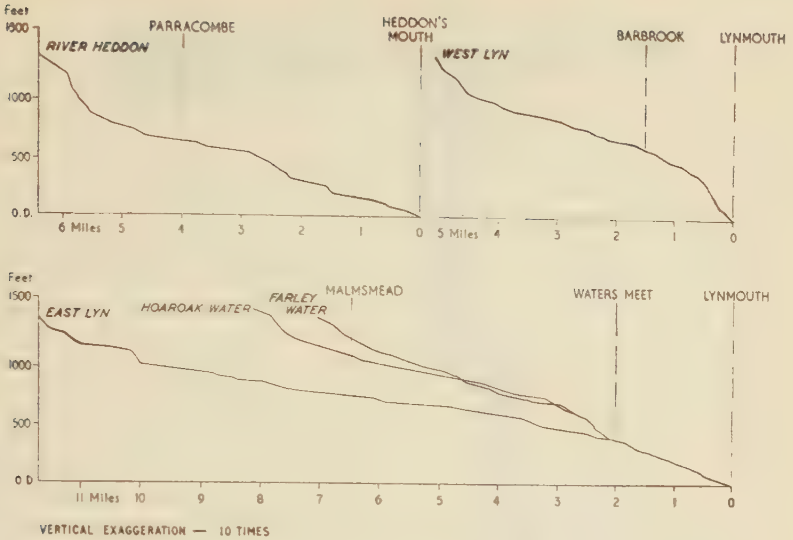

Fig. 3.—Longitudinal profiles of the East Lyn, West Lyn and Heddon.

In Lynmouth itself, the dam of the West Lyn was already to hand. Here, the stream has for many years joined the East Lyn, in a regulated course, through a culvert. A road and a large number of houses and hotels had been built across the mouth of the West Lyn valley. The culvert was quite incapable of accommodating the flow of water of the magnitude indicated above.

It has been estimated[12] that some 6,000 cu. yards of boulders were strained out of the West Lyn river by that part of the town standing between the river valley and the valley of the East Lyn. This accumulation formed a dam across the West Lyn and when this dam eventually burst, the river changed its course and took a direct route to the East Lyn at Lyndale Bridge some hundreds of feet east of its former course. It carried all before it (Fig. 4).

For the geomorphologists, the floods in the Exmoor region serve to re-emphasise the nature of the processes by which a river carves out its valley. The West Lyn in a single day moved more than 50,000 tons of boulders, some of which weigh more than 10 tons, and it is estimated[13] that the deltaic deposit on the right bank of the East Lyn river in Lynmouth contains some 200,000 cu. yards of boulders, debris and soil, most of it brought down at some time by the West Lyn river. It is in times of flood, of which that of August 15th is an extreme example, that much of the work of valley excavation is achieved.

The change of course of the West Lyn in Lynmouth is a characteristic feature of valley development. In the valley of the East Lyn, the river cut across several of its meanders, and changes of course,

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[12] Preliminary report to the Devon Rivers Board by C. H. Dobbie, Consulting Engineer, September, 1952.

[13] Preliminary report to the Devon Rivers Board, *op. cit.*

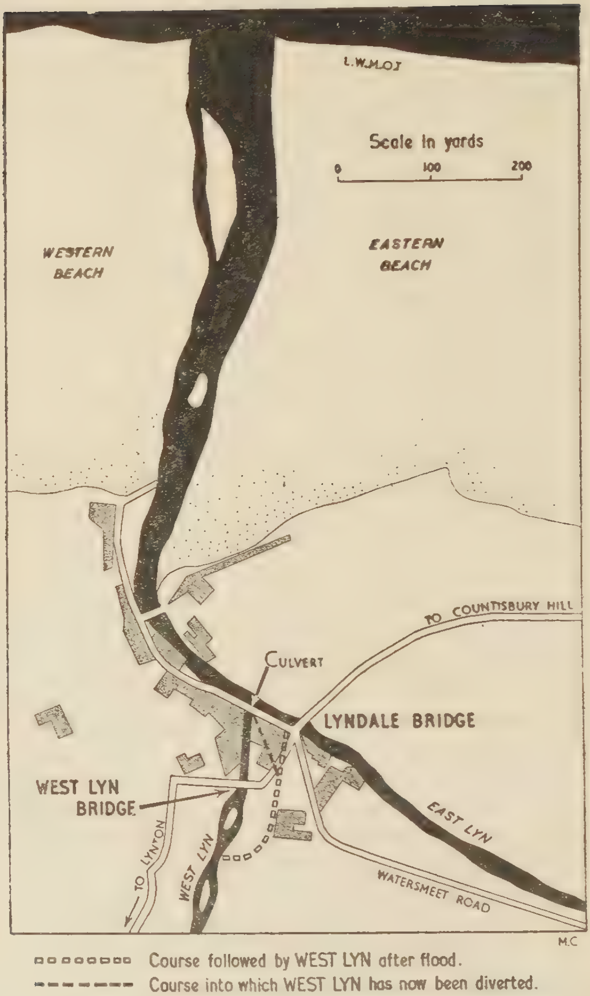

Fig. 4.—Sketch map of Lynmouth village.

small in character, took place during the floods in the Barle near Dulverton and in the Exe near Winsford. It is open to question whether the action immediately taken to re-divert the West Lyn into a course approximating to that which it had occupied before the flood, was a wise one. While there appear to be no records to confirm the suggestion of Lynmouth inhabitants that the West Lyn had, in the flood, simply re-occupied a course from which it had formerly been artificially diverted, the river appeared to have selected during the flood a much more natural course than either the pre-flood course or its present one.

It is quite clear that a flood of the dimensions of that which occurred in the Lyn valley on August 15th would, in any circumstances, have had far reaching effects. It is also clear that the effects of the flooding

were very much aggravated by temporary damming of the rivers by trees and boulders, piling against bridges and creating a surging effect in the flood. In the case of Lynmouth, the very nature of the construction of the town meant that this damming effect reached disastrous proportions. It has been suggested that the effects of such heavy rainfall as occurred would have been minimised if afforestation of the headwater regions of the Exmoor rivers had been carried out. Apart from any question of the feasibility of such afforestation, it must be pointed out that the river valleys themselves are already densely wooded, and the existence of large fallen trees in the valley bottoms contributed in no small way to the scale of the damage. It is doubtful if variation in vegetation would avert any but the very worst effects of rainfall of such intensity, and it is possible that a policy of clearing woodland in the valley bottoms would minimise these effects even more. Disasters of the Lynmouth variety are always possible under similar weather conditions for a town in a similar situation, and such disasters can only be rendered impossible if sites such as Lynmouth are avoided.

II.—LANDSLIDES ON EXMOOR CAUSED BY THE STORM OF 15th AUGUST, 1952

JOYCE GIFFORD*

THE torrential rain of August 15th fell during the late evening when the moor-top peat and the thin soil and vegetation cover of the surrounding slopes were already saturated. Rain had fallen for several hours during the day, springs were noticeably active by the afternoon and streams were in spate[1]. Then came the exceptionally heavy rain of the evening when as much as six inches of rain fell within five hours on the central summits of Exmoor, where The Chains ridge forms the watershed between north- and south-flowing streams. The gently sloping moor-tops were soon awash with water which poured from the plateau as raging torrents down the combes, or as sheetfloods. Vegetation and soil were stripped from hillsides and valley bottoms to expose bare rock or patches of hill-creep debris on gentle slopes. When stripped of its protective cover this debris was soon gullied by streams which cut gorges up to twenty feet deep before reaching bedrock. The hill-side scars provide unusual opportunities for an examination of the processes involved in the development of these slopes, where rock skeleton may now be seen side by side with surface form.

* Mrs. Gifford is a member of the Staff of the Department of Geography, University of Southampton.

[1] A. Bleasdale and C. K. M. Douglas, *op cit.*

The area affected by landslides extends from the headwaters of the Heddon and Bray rivers in the west to the upper valleys of the Exe and Badgworthy some nine miles to the east. A number of scars are found above the steep-headed combes which cut into the western end of the main watershed, notably those of the Hoaroak Water and the West Lyn, but the greatest concentration is along the steep north-facing valley-side of the Exe beginning nearly two miles from its source on the plateau and continuing for two and a half miles down the valley. A few landslides occurred outside the area shown on the map (Fig. 5) but most of these were induced either by stream erosion at the foot of the slope or by concentration of water along a road or a track. Such special conditions were responsible for some of the features shown on the map ; in particular the three scars south-west of Simonsbath which lie below the main road are the result of combined sliding and gullying.

The map also shows the extent of the high plateau surface. These flat or gently sloping summits are peat-covered and ill-drained. They carry a moorland vegetation of tussocky grasses, rushes and bog-moss accompanied by cotton-grass (*Eriophorum*) and deer-grass (*Scirpus*) in the wetter places and by heather where drainage is improved. On the narrow interfluve between the Exe and the Barle cultivated land climbs to a height of over 1,400 ft. O.D. but this is exceptional.

Where the plateau gives way to the slopes of the encroaching valleys the change in the vegetation is marked. Bracken appears amongst a *Nardus* mat and increases down the slopes except where close grazing has maintained a clean fescue sward. Locally heather replaces grass and bracken. Patches of rushes, tussocky grass and bog-moss draw attention to areas of waterlogged soil below springs and seepage points on the hill-sides. Although frequently occupying shallow depressions which run the full length of a slope, these patches are sometimes isolated areas on the middle of a slope. They are not everywhere clearly defined and the " flush " vegetation may grade into rush-scattered turf and so to a bracken-infested turf. The smooth valley slopes are rarely interrupted by rock outcrops, but resistant strata in the dominantly southward-dipping Devonian slates which underlie the moors appear as slanting ridges running up the sides of the transverse Swincombe and Badgworthy valleys and as asymmetrical hummocks along the strike valley of the Exe near Warren Farm.

The slopes lead down to rush-filled valleys which have a surprisingly mature appearance because accumulation of rock debris and peat have transformed rocky ravines into flat-floored trenches which extend right into the watershed area. Where stream erosion has steepened a slope the change from turf or heathery slope to rushy bottom is abrupt, but where drift has been able to accumulate on gentle lower slopes rushes spread up from the valley floor and the change is more gradual. Rushes occupy the boggy depressions around many of the steep combe-heads and follow the uppermost parts of the Exe and

Badgworthy streams which rise on the plateau top in shallow open valleys with gentle gradients.

It is with vegetation cove:, which is itself an indicator of ground-water conditions, rather than with angle of slope that the distribution of landslides can be most closely correlated. Most of the landslide scars lie within patches of " wet " vegetation on slopes varying in

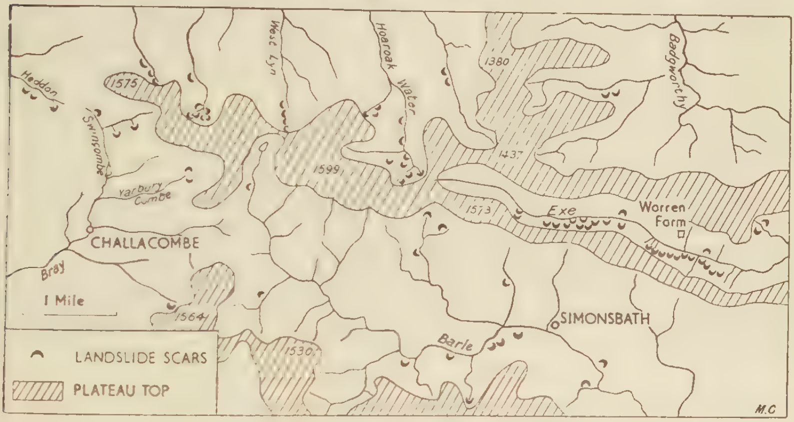

Fig. 5.—Landslides on Exmoor.

steepness from thirty degrees or more to as little as eight degrees. Sometimes a slide has spread to adjoining well-drained fescue sward as it has widened downhill, but slides rarely began in " dry " vegetation. No scars have been found on heather-clad slopes. The existence of this correlation of landslides and vegetation at once raises two further questions. How is it that this " wet " vegetation can be easily stripped off some slopes while much steeper slopes remain stable under other types of vegetation cover ? And are areas of " wet " vegetation located permanently on sites which may be expected to suffer repeated land-slides or do they migrate along a slope and lead to stripping of many parts of a slope in turn ?

Careful examination of a number of scars has provided clues which point towards an answer to the first question ; a brief description of these scars will therefore be given. With one notable exception all the features examined might be described as " fragmental "[2] or " debris "[3] slides. The vegetation and soil mat alone slid down the slope to accumulate in heaps at the foot or to come to rest in scattered lumps on the slope itself. (Plate VII.) The vegetation mat rarely remained intact and usually broke up immediately after the first movement. Bare rock is now exposed at the head of most scars and water trickles from the base of the clumps of vegetation above.

[2] W. H. Ward, " The Stability of Natural Slopes." *Geogr. Journ.*, vol. 105, 1945, pp. 170–191.

[3] C. F. S. Sharpe, *Landslides and Related Phenomena.* Columbia Univ. Press, New York, 1938.

The soil here is usually waterlogged. Roots reach down to the rock but fail to penetrate it. Further down the scar bedrock may disappear beneath a thin smear of soil with root fragments indicating that a slight rotation of the sliding mass allowed the soil-root mat to be sliced through instead of being torn away bodily. This is particularly noticeable in the smaller slips where the initial scar was not extended by downhill stripping and where subsoil water is limited. The most extensive scars run almost from top to bottom of the slope and whenever they have been visited water has been flowing down these scars in considerable quantities. The slates exposed have a stained and water-worn appearance, which suggests that subsoil water has been active and plentiful for a long time. Most slides, apart from some instances on the lower slopes induced by undercutting, are found towards the top of a slope or at a slight inflection on a slope. In one case it has been possible to trace the seepage line above a scar to a junction of relatively permeable and impermeable strata.

The landslides involving grass sward have either begun in an area of flush vegetation from which they have spread to adjoining patches of fescue turf, or have taken place on particularly steep slopes. Unlike the tussocky flush vegetation which readily breaks apart, a turf mat tends to move as a piece. At the head of Yarbury Combe a patch of turf adjoining a patch of rushes has moved several inches down a slope of eighteen degrees without breaking at the toe of the slide; there it has rucked up into two curved moraine-like ridges, eight inches high. Such is the cohesion of this type of vegetation mat that subsoil drainage has in some places removed underlying debris to form miniature caverns without collapse of the turf. A number of incipient slides may be found where breaks in the turf failed to develop. This cohesion must be an important factor in the greater stability of slopes under fescue turf. Two scars towards the bottom of an oversteepened slope in the Exe valley showed sections in a well-drained brown soil and slight seepage of water along well-defined slip planes. Slow creep must be the normal process here and exceptional conditions of saturation and lubrication are required before sliding takes place.

The factors favouring the stripping of flush vegetation appear to be the availability of subsoil water (which at the time of the storm must have been much increased and so capable of lessening the precarious hold of roots on the underlying rock and even of lifting the vegetation) and the character of the vegetation itself which tends to be loosely bound and tussocky. The individual clumps must be quite heavy when fully saturated and are big enough to hinder the movement of water flooding down a slope and so to derive momentum from it.

The question of the recurrence of landslides on any one site can be considered most usefully by special reference to the Exe valley where scars are numerous and varied. From the preceding observations one might expect springs and seepage points to initiate flush vegetation which would be stripped away during floods to re-expose bare rock

ate V.—The West Lyn flowing in its new course on August 18th. The damaged Lyndale Bridge over the East Lyn can be seen on the left of the hotel.

ate VI.—Work in progress on August 18th for the re-diversion of the West Lyn. The channel being excavated was occupied for a short time during the flood.

Plate VII.—Small debris slide at the head of the Heddon Valley, grid reference 687433. A fo'd O.S. map has been placed on the slip surface to give scale.

Plate VIII.—Warren Farm debris avalanche, grid reference 800405.

and hasten the development of a depression and ultimately a gully and tributary stream. In some places this is undoubtedly happening and the process is responsible for the maintenance of steep combe heads and for the growth of shallow depressions on some of the gentler slopes. But the slides along the Exe valley show that such concentration is not inevitable and that the process may assist in the development of slopes other than by localised linear erosion.

To the east of the Simonsbath–Brendon road the Exe occupies an asymmetrical flat-floored trench more than two hundred feet below the plateau level. In its eastward course it has a catchment area that is little more than the area of its own valley, for it has no important tributaries and the narrow plateau remnants above the valley are shared with the catchment areas of the Barle and the Badgworthy. The steep north-facing valley side is cut by a number of gullies which scarcely notch the plateau margin. Rising in rushy depressions at the brow of the slope, streams flow straight down the steep valley side cutting ravines on the mid slope before sinking into debris fans at the foot. The small catchment areas feeding these streams fail to keep them very active under normal conditions and the ravines are cut mainly during periods of flood. The plateau above was probably one of the areas of heaviest rainfall during the recent storm and an eye-witness describes it as being covered with water several inches deep. Much of this water poured down the gullies clearing away vegetation and loose debris and channelling the foothill fans. The remainder went down the slopes and caused widespread damage.

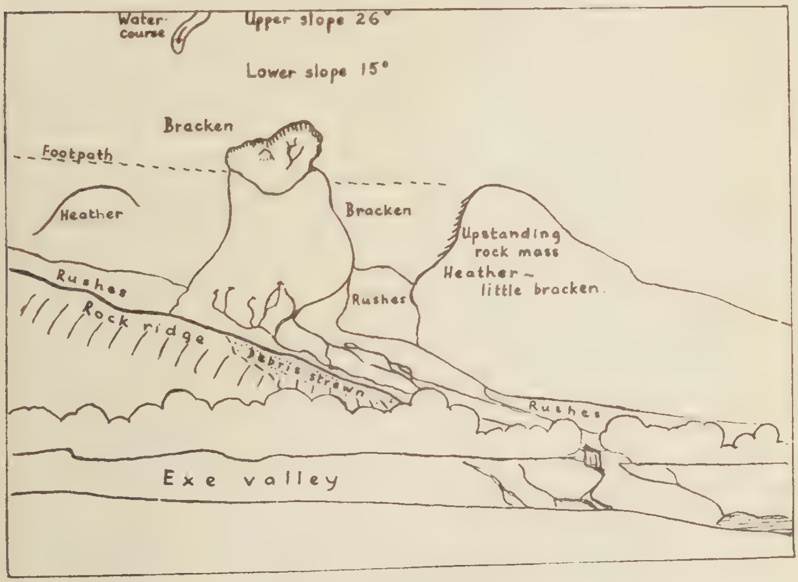

Fig. 6.—Key to Plate VIII.

Landslide scars expose quartz-veined southward-dipping slates from top to bottom of the slope. Local variations in lithology and direction of dip are visible as well as a number of fracture planes, many of which are vertical. All the gullies visited proved to be sited along fractures and in the ravine known as the Raven's Nest this is particularly clear. (Fig. 7.) The shrunken stream now trickles down a cleft as straight as a knife cut. Lines of weakness are likewise concentrating the flow of water over some of the new landslide scars on slopes which as yet show no sign of indentation but which in time may become gullied. In one case an oblique fracture diverted the downhill extension of a large stripped area and is now being developed by stream erosion as water trickling over the scar is gathered along it.

The scars which show no major fractures are of equal interest. Lacking the guidance provided by a marked zone of weakness, the water trickles over all or most of the area, or, where the ribbed slate outcrops slant across the slope, becomes concentrated along that margin of the scar to which the slanting ribs may lead it. One such scar is particularly instructive because it provides evidence of the migration of landslip sites. Slate ribs cross the scar with a marked slope down to the east and water is consequently directed to the eastern margin where some of it must seep into the shallow soil cliff that limits the scar. This brown soil supports grass and bracken and is in marked contrast to the thin wet soil with its rush and bog-moss vegetation on the western margin of the scar. Drainage of this wet soil, which appears to occupy the site of an old slide scar, may be expected to be improved in time while rushes invade the opposite margin as the soil there becomes increasingly waterlogged. This may well be the site of the next slide. Evidence favouring this hypothesis is provided further along this valley side by a scar in an area of rush infested turf only a few feet from a strip of rushes and moss which remained unaffected by the recent floods. This belt of rushes and moss appears to occupy the site of a recent slide scar and it may be that its thin and discontinuous soil mat was unable to hold enough water to augment its weight sufficiently to lead to sliding. It would thus appear that parts of this slope are retreating by successive phases of stripping and weathering of rock which migrate along the slope, but that locally a concentration of water along faults is allowing more rapid erosion and the formation of ravines.

All the slides along the steep north-facing slope of the Exe valley are shallow features affecting soil and vegetation only but one scar on the opposite slope is much deeper and of a very different character. This is sited midway down a bracken-covered slope and a short distance west of Warren Farm and is shown in Fig. 6 and Plate VIII. Slaty debris from a deep hole has poured down a slope of fifteen degrees, clearing its path of bracken and mantling the grass with debris. On reaching the small tributary valley at the foot of the slope most of the debris was diverted down that valley to pour into

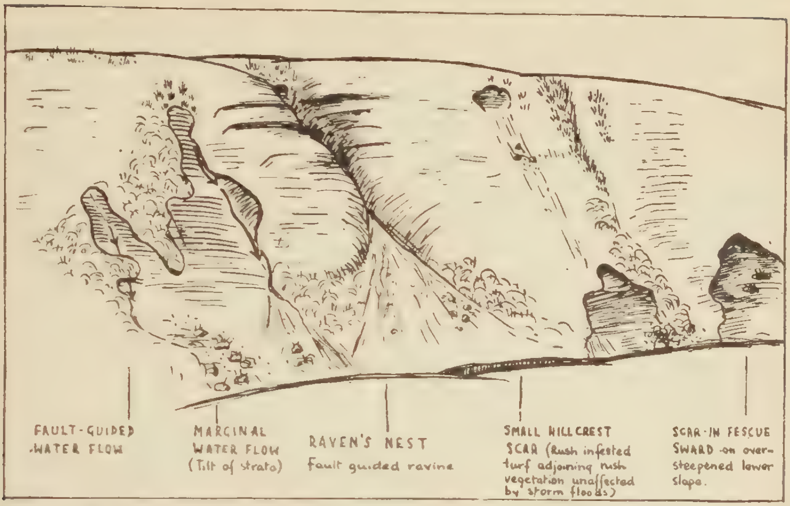

Fig. 7.—Sketch of part of the steep north-facing slope of the Exe valley, including the Raven's Nest ravine, grid reference 778409.

the main valley, but some was carried straight across and up the opposite slope to mantle completely the lower end of the interfluve ridge. Such a remarkable uphill flow indicates that the movement was sudden and rapid, and in the nature of a mudflow rather than a slide. Elsewhere on Exmoor swollen tributary streams failed to make a smooth junction with the waters of the main stream which they join at right angles, and swept up the valley slope opposite leaving a patch of water-flattened vegetation with a curved upper boundary. A similar action must be envisaged in this earthflow.

The scar is sited a few yards below a break of slope between a steep upper part of twenty-six degrees and a lower slope of fifteen degrees. Bedrock is exposed at a number of points on the floor of the scar and it seems that the break of slope coincides with the disappearance of rock beneath a mantle of debris that thickens downhill. Water trickling down the upper slope a few yards further west disappears along the break of slope, presumably by sinking into this debris. The fifteen feet high cliff section exposed around the scar shows slate fragments and occasional flat sandstone fragments set in a loamy matrix, with rough stratification sloping gently downhill. The deposit thins up the slope and at the head of the scar bedrock is only eight feet below the surface. The rock here is a weathered slate which breaks up readily into small fragments and at the junction of rock and drift there is a zone in which fragments have been orientated downhill while still in contact with the source rock. This is clearly a hill-creep deposit and it is remarkably consistent in composition below the level of the top three feet in which rock fragments are less plentiful and a yellowish-brown loam predominates. Bracken roots penetrate through the well drained soil to the base of this loamy capping and there is no

well defined break between soil and subsoil. Slipping of the soil and vegetation mat over the subsoil cannot have taken place here and there is no evidence of gullying above the head of the scar. It is probable that the failure was the result of reduced cohesion and shear resistance in this unusually thick superficial deposit when it became saturated with water. After the main movement had left a hole in the deposit, water drained into this hole through a series of channels the size of rabbit-holes and a number of these can be seen in the cliff, roofed with pieces of stone which prevented collapse. Gullies leading from beneath these holes cut below the general level of the floor of the scar and expose rock along the bottoms of their channels.

This type of mass movement has been found nowhere else on Exmoor and deposits of similar character and depth are known only through exposure by gullying. Deep gullies at the head of Yarbury Combe and Swincombe were probably actively draining the drift deposits through which they trench at an early stage of the storm. Because of its unusual siting the Warren Farm deposit suffered no gullying. It lies between two resistant rock masses, one of which is clearly visible on the photograph by virtue of the contrast in vegetation between the bracken on the deep soils of the drift and heather and turf on the upstanding rock mass. The form of the ground seen to the left of the scar suggests that a similar resistant mass occurs here. These are two of a series of rock slabs that rise above the valley side in this stretch of valley. Their position here has allowed the accumulation of debris in the pocket between them. Before the recent storm, drainage of the deposit was by seepage at the foot of the slope below the site of the new scar and possibly also upstream of the supposed rock mass to the left of the scar, where there is a light streak on the photograph. Water flows into the deposits from the steeper slope above, along a gully which ceases as the water gradually sinks below the surface. During the storm the whole of the deposit must have become saturated as seepage failed to keep pace with entry from above. Since the storm the floor of the scar has been practically dry and drainage is again by seepage at the foot of the slope.

The landslide phenomena of the Exmoor storm are thus of two types. The majority are slides in which saturated vegetation and soil have been stripped off a lubricated subsurface of rock or drift, but an exceptional scar, and that the deepest, is the result of flow of saturated material. Following Sharpe's[4] classification this latter might be called a "debris-avalanche," the term he uses for the humid region equivalent of the torrential mudflow of semiarid lands. The typical debris-avalanche "occurs on a steep mountain slope or hillside in a humid climate and is almost invariably preceded by heavy rains which increase the weight of the unadjusted material and aid in its lubrication." The slope at the head of the Warren Farm scar is a little below the range of slope given for recorded features which is

[4] C. F. S. Sharpe, *op. cit.*

from " about twenty to forty degrees." Sharpe justifies the use of a term more commonly associated with movements of snow and ice by the precedent set by Silliman when he used the term " avalanche " in his descriptions of mass movement in the White Mountains of New England, published in 1829[5].

The first type of movement fits less satisfactorily into Sharpe's classification. One of his main distinctions is between " rapid flowage " which includes debris-avalanches, and the rapid movement of " relatively dry " material to which he restricts the use of the term " landslide." " Landslides," he writes, " usually have sufficient water to aid in lubricating a slip surface, but if excess liquid is present the mass may assume the characteristics of the debris avalanche, mudflow or earth-flow." This definition presupposes the availability of material suitable for the formation of a mobile flow. In the case where thin soil and vegetation overlie impermeable rock, abundant water can do little more than strip off this cover, break it apart and carry it down the slope. Surplus water may help to extend the area of initial stripping but cannot produce flowage. This limitation of the classification has been noted by Cumberland[6] in his descriptions of soil erosion in New Zealand, where he describes features similar to the Exmoor slides as a " moist phase of Sharpe's debris-slide." Abundant water and saturation is certainly a requisite of the type of slide widespread on Exmoor.

The writer is most grateful to Mr. C. Archer, a voluntary observer for the Meteorological Office, and to Mr. A. Bleasdale of the Meteorological Office for their help in checking the map showing the distribution of landslides. Mr. Archer has made a complete field study of the effects of the storm over Exmoor and it is unlikely that any landslide features in the area shown on the map have escaped his attention.

[5] B. Silliman, C. Wilcox and T. Baldwin. " Miscellaneous Notices of Mountain Scenery, and of Slides and Avalanches in the White and Green Mountains." *Am. Journ. Sci.*, 1st Ser., vol. 15, 1829, pp. 217–232.

[6] K. Cumberland. " Contrasting Regional Morphology of Soil Erosion in New Zealand." *Geogr. Rev.*, vol. 34, 1944, pp. 72–95.

Photographs for plates II to VI are by Mr. Kidson ; for plates VII and VIII by Mrs. Gifford. The photograph for plate I was kindly furnished by Mr. P. O. Denham.

THE BROWN COAL INDUSTRY OF GERMANY

T. H. Elkins*

An important distinction between the coal industry of Germany and of Great Britain lies in the importance in Germany of brown coal,[1] the production of which in this country is negligible. It is brown coal which provides the coffin-shaped briquettes which fire the closed stoves of the German home, and brown coal which is the most important single source of German electricity, providing about 40 per cent. of the pre-war supply. It is in addition a major raw material of the chemical and oil industries. In 1936, the area of the then German Reich produced 158·4 million tons[2] of bituminous coal and 161·4 million tons of brown coal. When allowance is made for lower heating value at the rate of 9 tons of brown coal to 2 tons of bituminous coal, the figure is reduced to 35·9 million tons, but is nevertheless still considerable. Germany was, at this time, by far the largest producer, its 161·4 million tons in 1937 being followed by the U.S.S.R. with an estimated 18 million tons, by Czechoslovakia with 16 million tons and by Hungary with 7 million.[3] The principal brown coal deposits of Germany are now divided between the "German Federal Republic" (Western Zones) and the "German Democratic Republic" (Eastern Zone). The former produced 84·8 million tons in 1951, an increase of 26·8 million tons over 1936, while the Eastern Zone is estimated to have produced 150 million tons in the same year, an increase of some 45 million tons.

The Nature and Distribution of Brown Coal

Brown coal differs from bituminous coal in its lower heating value, its very high water content (up to 62 per cent.), its brown colour and its friable nature. It also differs in its mode of occurrence: the seams are normally very few and extremely thick, 30 to 60 ft. being quite common, while over 300 ft. is known in places. Normally the seams are quite near to the surface, usually not more than 300 ft. deep.

The two types of coal are, however, of essentially similar origin, both originating in slowly sinking swamps at a time of crustal instability, the one in Carboniferous, the other in Tertiary times. In Germany, the sinking of the Tertiary land surface was sometimes

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[1] The terms "brown coal" and "lignite" are normally used synonymously in this country. Lignite is however a woody type of coal which splits into slabs on drying, while brown coal is a brown, earthy, amorphous substance, which is not lignite, although it sometimes contains lignitic bands. The term "brown coal" will be preferred in this article, while coal of higher grade will be referred to by the admittedly unsatisfactory term of "bituminous coal."

[2] All figures in metric tons.

[3] Statistics from German Reichskohlenrat, *Statistische Übersicht über die Kohlenwirtschaft im Jahre* 1936 and Deutsche Kohlenbergbau-Leitung *Zahlen zur Kohlenwirtschaft*, Essen.

TABLE I.—RESERVES OF BROWN COAL, AND PRODUCTION OF BROWN COAL AND BRIQUETTES IN 1936, 1950 AND 1951.

	West German Districts			Central and East German Districts			
Year	Rhine-land	Bavaria	Hesse[2]	Helm-stedt	Leipzig-Halle-Magdeburg	East of Elbe (Lausitz)	Total
Percentage of Total Reserves, known and probable.							
(a) Open-cast.							
1935	13·2	0·6	0·4	4·9[1]	39·7	41·2	100·0
(b) Total.							
1935	31·3	0·4	0·7	3·3	16·9	47·4	100·0
Brown Coal Production, Thousand Tons.							
1936	46,519	2,062	2,992	4,219	64,211	41,354	161,357
1950	63,677	3,215	2,909	7,584	137,004[3]		214,000[3]
1951	69,200	4,221	3,179	8,189	150,000[3]		235,000[3]
Briquette Production, Thousand Tons.							
1936	10,305	148	233	763	14,241	10,392	36,082
1950	13,410	113	175	1,214			14,912[4]
1951	14,347	125	152	1,300			15,924[4]

[1]Includes Magdeburg.
[2]Includes *Pech* coal.
[3]Estimate.
[4]Western Germany only.
Figures from Reichskohlenrat and Deutsche Kohlenbergbau-Leitung, *op. cit.*

caused by local tectonic movements of folding and faulting, or even by solution of salt from the underlying Triassic rocks. Alternatively there was sometimes a more general movement of land in relation to sea. The proportion in which the two kinds of movement were combined determined the nature of the coal seam. Where local movements dominated, as in the earlier (Eocene) period of coal formation, there are many local variations in thickness. Where more widespread movements dominated, as in Central and Eastern Germany in the Miocene, coal seams tend to be more continuous and more uniform.

In their distribution, the brown coal deposits of Germany are naturally clearly related to areas of Tertiary sedimentation. By far the most important are situated on the southern fringe of the North German Plain, particularly in the lowland "bays" of Cologne and Leipzig, which penetrate southwards into the older rocks of the German Central Uplands. The deposits of the Plain are divided into a Central German and a Rhenish group, of which the former is the greater. By comparison, the fields that lie to the south, in scattered Tertiary basins in the Central Uplands or in the Tertiary rocks of the Alpine Foreland, are unimportant.

The producing districts can most conveniently be divided as follows :—

1. Central German Districts.
   (a) Halle-Leipzig. The greatest producing district, containing Halle, the capital of German brown coal mining.
   (b) Fields in German territory east of the Elbe, by far the most important being those of the Lausitz.
   (c) Helmstedt-Magdeburg. A lesser producing district in the Harz Foreland N.W. of Halle-Leipzig.

2. The Rhenish (or Cologne) District. Situated to the west of Cologne.
3. Minor fields in the Central Uplands (Westerwald and Hesse), and in the Bavarian Alpine Foreland.

Brown Coal Mining

The brown coal industry in its modern form has relied overwhelmingly on open-cast mining, the proportion of deep-mined coal decreasing from 80 per cent. in 1880 to 5 per cent. in 1943. It has been only by the development of the most modern and large-scale methods of open-cast mining that this low-value fuel has been able to compete with the higher quality bituminous coal. However, neither in the geological conditions nor in the methods of mining employed can the German industry be compared with open-cast mining in this country. Although the absolute depth of overburden removed may be much greater than is normal here (150 ft. or more in the northern part of the Rhenish district for example), the ratio of overburden thickness to coal is extremely favourable owing to the great thickness of the seams. Over most of the Rhenish District it is 1 : 1 or less, and while conditions in Central Germany are normally less favourable, over Germany as a whole, the outside limit of open-cast mining is put at an overburden/coal relationship of 5 : 1. Apart from the thickness and depth of the seam, conditions vary from those of Britain in the unresistant nature both of the coal and of the overburden of sands, gravels and clays. Blasting is not necessary, mining is wholly mechanised, continuous, and on a very large scale ; output per man is high. As a result, at pit head prices, the cost of brown coal is only about one-tenth that of Ruhr coal, which more than makes up for its low heating value.

The first stage in mining is to remove the overburden with very large excavating machines, which scoop up the unconsolidated overburden by means of chains of buckets. If the overburden is thick enough, working proceeds in a series of steps. The waste material is then carried either over the workings by a movable transporter bridge or round them in outsize railway waggons, and is tipped into the exhausted workings. The coal itself is worked in a single long face, possibly as much as 2 miles in length, and up to 300 ft. high, according to the thickness of the seam. In this face, a wide step or bench is cut, on which run the machines which work the coal. These either scoop up the coal from below in chains of buckets, or claw it down from above, so that the whole face, with the bench, gradually advances. By this method all the coal is delivered to one level on the bench from which waggons remove it to the briquetting plants or power stations. Together the machines can work up to 130 ft. of coal : if the seam is thicker than this, then a second bench must be opened. It will be realised from this brief description that the scale of working is immense, and inevitably involves proportionate difficulties in land planning and restoration.

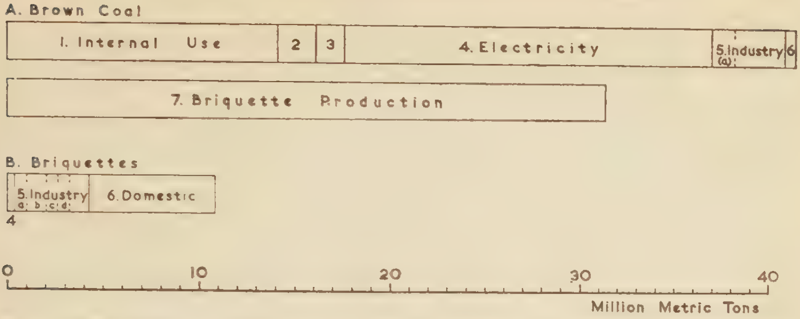

Fig. 1.—The utilisation of brown coal and briquettes in Western Germany, 1949. (1) Internal use of brown coal industry. (2) Low temperature carbonisation. (3) Deliveries to Eastern Zone power stations. (4) Electricity production. (5) Industrial use, including (*a*) chemicals, (*b*) metal-using industries, (*c*) glass, pottery, (*d*) food and agriculture. (6) Domestic consumption. (7) For briquette production.

The Utilisation of Brown Coal

The technical and economic difficulties associated with the use of brown coal are so great that not until the 1880's in Central Germany, and the 1890's on the Rhine, did it become of more than local importance. The main difficulty is that, by reason of its low heating value, and especially in comparison with bituminous coal, brown coal is extremely uneconomical to transport. Rhenish brown coal, for example, has only two-sevenths the heating value of average bituminous coal, and is in fact about 60 per cent. water, which it obviously does not pay to transport. Moreover, the coal disintegrates on handling (which makes it useless to the ordinary consumer) and is liable to spontaneous combustion on drying, the dust in particular being violently explosive.

It will be seen that fuel of this nature must either be used very close to the pit, or it must be changed into a form that is economically and physically capable of being transported. The principal means of doing this are :

(1) briquetting ;
(2) burning the coal to produce electricity ;
(3) using the coal as the basis of various processes resulting in tar, coke, gas, oils and chemicals.

The utilisation of brown coal in the German Federal Republic in 1949 is shown in Fig. 1. These statistics relate to Western Germany only, and would not be typical for Germany as a whole. In particular the use of brown coal in the chemical industry is far less developed in Western than in Central Germany.

The making of briquettes was the first solution to the problem of transport. The coal is hauled directly from the pits to the briquetting plant, where it is dried by steam to 15 per cent. water content and forced by presses into briquettes. About 2·1 tons of coal are needed to make 1 ton of briquettes, but in addition over 1 ton of coal is consumed to provide heat and power for the briquetting process. Accordingly each ton of briquettes requires about $3\frac{1}{4}$ tons of brown coal,

but the result is a compact, transportable fuel of greatly increased heating power. This difference is reflected in price: in the Rhenish district briquettes cost $5\frac{1}{2}$ times as much as untreated coal.[4] It will be seen from Fig. 1 that about two-thirds of the briquettes are used by household and small consumers, and in normal times this proportion would be higher.

The second solution is the manufacture at the pit of electricity, which can be transported through the grid system. Because of its cheapness at pit head, and despite the lower heating value, brown coal produces electricity at a lower price than bituminous coal. The cost advantage is stated to be something like 1 : 2·5, and for this reason brown coal stations are used as far as possible to meet the base load, that is they are kept running as continuously as possible, while bituminous coal stations are used to meet peak demand.

The drive for German self-sufficiency, especially after 1933, made brown coal also a major raw material of the oil and chemical industries. Tar obtained from the coal by low-temperature carbonisation was either distilled or used in high-pressure hydrogenation plants to produce motor fuel and other oils, and the bases of synthetic rubber. The coal was also used directly in some hydrogenation plants, and in the plants of the Fischer-Tropsch process for the production of synthetic oils and chemicals. Most of the plants mentioned were located in Central Germany, mainly because of the higher quality coal there. They were of major importance to the German war machine, providing at their peak over one-third of the oil production of the Reich. Most suffered either war damage or dismantling, but the majority of the Eastern Zone plants appear to be operating again now.

There remains for consideration the use of untreated brown coal as an industrial fuel, a use which, through its limitation to the vicinity of the mines, is important only in those industries which can be carried on in brown coal mining districts. Such an industry is beet sugar preparation, since the loess soils of Central Germany and the Cologne "Bay" are very suitable for growing sugar beet. A similar relationship is seen to the great chemical industry which uses the potash and rock salt of Central Germany. A more recent method of using the coal as fuel is in a dried, pulverised, form. This highly explosive material is transported by rail in special containers from which the air is excluded.

Marketing and Transport of Briquettes.

Like so many German industries, the brown coal industry has long abandoned unrestricted competition in favour of some form of association between producers. The form of association has varied with the years, and differs with the producing district, but three functions are always clear. Firstly there is the "cartel" or "syndicate" proper, which regulates prices and output. Secondly there is a sales organisation, which disposes of the output of all firms in the district, at the prices fixed, and under a common trade mark.

[4] Deutsche Kohlenbergbau-Leitung. *op. cit.*

Finally there is normally an organisation for representing the interests of the industry with central and local government organisations, and with the State railway and canal administration. This has been most important for the growth of the industry, as in Germany railway and canal rates have always been subject to manipulation by the State for social, economic, or political reasons. In the process of rate fixing, there is a considerable opportunity for the exertion of pressure on the government by powerful industrial groups, and in fact the expansion of the brown coal industry has only been possible through a bitter and not always successful struggle for equality of treatment with the existing and strongly entrenched bituminous coal interests of the Ruhr and Silesia. It will, therefore, be seen that the successful development of brown coal mining in Germany has depended in part upon political devices.

The Brown Coal Producing Districts

1. *Western Germany*

The only major producing district in Western Germany is the Rhenish district, which lies west of Cologne. Here, brown coal originated in Miocene times in a basin on the northern fringe of the Rhine Uplands, between the Eifel and the hills of the Berg District of the Sauerland. The long continued subsidence of the area allowed the accumulation of a coal seam of great thickness, which was, however, fractured by later movements. As a result of this fracturing, most of the working pits are found along the Ville Ridge, which runs in a northwest-southeast direction about 8 miles west of Cologne. Here the seam is at, or near, the surface, is fairly undisturbed and from 60 to 300 ft. thick. To the east, where Cologne stands, the main seam has been upfaulted and eroded away. To the west, the seam has been carried several hundred feet down in the Erft Basin, where, now that the open-cast mining areas are fully developed, experiments are being made with deep mining. Further to the southwest the coal rises again to outcrop on the fringe of the Eifel, where there are some open-cast workings in the Düren district.

It will be observed from Table I that the production of the Rhenish field was less than that of either the Halle-Leipzig or the Lausitz fields. The reserves of coal available for eventual deep mining in the Erft Basin, however, exceed the reserves of any other German field, so that the future of the district seems to be assured. The coal has not had the same importance for the development of great local industries as has the coal of Central Germany, presumably because of proximity to the superior bituminous coals of the Ruhr. In addition, the Miocene coal of the Rhine is of such low bitumen content as to be unsuitable for most of the chemical processes that have been described, the only exception being the hydrogenation plant operated at Wesseling during the war. The district, therefore, concentrates on the marketing of coal elsewhere, either as briquettes or as electric power. This power comes in part from the private stations of the briquetting plants, but in the main from the public supply stations, of which the Goldenberg

works at Knapsack is the greatest. Very great extensions to both types of works are being made, which will raise the capacity of the public plants alone from a post-war 690,000 kw. to over 2 million kw. in the early 1960's. The power reaches the rest of Germany through the switching station at Brauweiler, west of Cologne, which is also connected with the Ruhr bituminous coal stations and the Alpine water power stations, and is a centre of European importance.

Although the Rhenish district supplies briquettes to all parts of Western Germany, a great characteristic has always been its concern with the south German and export markets, and the use of the Rhine waterway to supply them. The southern end of the field is within 4½ miles of the Rhine, and is linked by private railway to the Rhine port of Wesseling. The industry has its own river fleet, which uses the great waterway and the Main and the Neckar to supply the south German market. The same waterway serves the French port of Strasbourg and the Swiss port of Basel, as well as Holland in the downstream direction. About one-quarter of the briquette output of the Rhenish field moves by the Rhine, mostly to southern Germany, this use of water transport contrasting markedly with Central Germany. In addition, since Germany's normal export markets for brown coal products lie to the west, from Denmark to Switzerland, exports are of greater importance to the Rhenish than to the Central German districts. In 1936, the western fields exported 8·6 per cent. of their briquette production, but the Central German fields exported less than 0·5 per cent. This export activity continues to-day: in 1951 the Federal Republic exported 10 per cent. of its briquette production, Austria, for political rather than economic reasons, being the largest customer.[5]

It may be noted that before the war the production of the West German fields was insufficient to supply the whole of the present area of the Federal Republic, and it is estimated that about 6 million tons of briquettes came annually from Central Germany. The loss of this supply is one of the causes of the shortage of briquettes in Western Germany to-day, and together with the demands for electric power from a growing German industry has given much greater importance to the Rhenish field. Annual production has been steadily increasing in recent years, and is planned to reach 100 million tons of coal. Nearly all the increase will be used for electricity production. The new demands for coal necessitate the opening up of the northern parts of the Ville field, where the coal will be worked in open pits to depths of 600 ft. To make this technically and economically possible, the pits will have to be of immense size, providing unprecedented problems in land planning.

The remaining western fields are of much less importance. There are thin coals in irregular deposits overlying the palæozoic rocks of the Westerwald in the Rhine Uplands, and deposits of more consequence in the Tertiary basins of Hesse. The coals of the Bavarian Alpine

[5] Deutsche Kohlenbergbau-Leitung. *op. cit.*

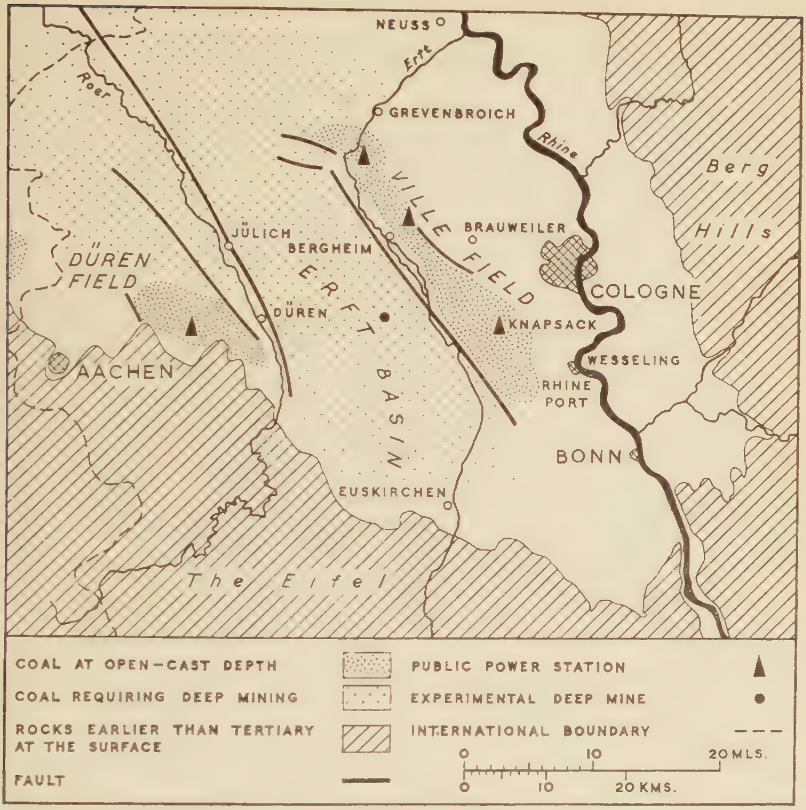

Fig. 2.—The Rhenish brown coal district.

Foreland are of some interest because they were caught up in the Alpine folding, which not only distorted the seams but by pressure transformed the Oligocene brown coal into something resembling bituminous coal, with a considerably increased heating value and a water content of only 12 per cent. This is known as *Pech* (pitch) coal.

2. *The Central German Districts*[6]

The brown coal deposits of Central Germany fall into two major and one minor producing districts. The greatest brown coal district of Germany is that of Halle-Leipzig. Beyond the Elbe to the east of this is the second great district, that of Lausitz, while to the northwest, in the northern Harz foreland, is the lesser district of Helmstedt-Magdeburg.

In the Halle-Leipzig district are the principal German deposits of the earlier Eocene brown coal, which is distinguished from the Miocene brown coal of the Rhenish district and Lausitz by its higher

[6] Because of the impossibility of visiting the producing districts within the German Democratic Republic, this section is in part derived from *Festschrift zum 50-Jährigen Bestehen des Deutschen Braunkohlen-Industrie-Vereins*, Halle (Saale), 1935.

quality and lower water content. The Eocene coal is present as a practically constant seam of 30 to 60 ft. in thickness between the Mulde and the Saale rivers, but to the northwest the Tertiary rocks and included coals break up into the isolated basins west of Halle and in the Harz foreland. Because of long-continued subsidence, certain of these basins have developed extraordinary thicknesses of Tertiary rocks and included coal seams, the coal reaching a thickness of 300 ft. in the Geiseltal. The eastern boundary of the Eocene coal runs along a north-south line through Leipzig and Dessau. This same line forms the western limit of the distribution of Miocene coal which is more typical of Lausitz and districts further east, and in the Halle-Leipzig district is important only as a 20 to 45 ft. seam in the Bitterfeld area.

It will be seen from Table I that this is the greatest producing district of Germany. It shares with the Rhenish district the normal outlets for its brown coal of briquetting and electricity generation. However, water transport of briquettes is unimportant. The district developed with the coming of rail transport, on which it still depends for the movement of about 90 per cent. of its products. In normal times, the Central German briquettes found their outlet, other than locally, in Berlin and the North German Plain, in Thuringia, and in those parts of south Germany which are not more economically served by way of the Rhine and its navigable tributaries.

In striking contrast to the Rhenish district is the high proportion of Central German coal consumed locally. In 1933, 62 per cent. of the brown coal and briquettes loaded in Rail Traffic District Merseburg (containing all but the southeast part of the Halle-Leipzig district) was consigned to destinations within the District or within the adjoining Land Sachsen. This can in part be related to the absence of such local competition as the bituminous coal of the Ruhr affords to the Rhenish brown coal, but it relates even more to what is perhaps the chief characteristic of the Central German fields, the growth of industry dependent upon brown coal. This growth has been greatest in the Halle-Leipzig district, but extends to the whole of the Central German industrial region.

The first considerable industrial use of brown coal was in the beet sugar industry, which grew up after the 1830's on the loess soils of Central Germany. By its demand for machinery, this industry helped in its turn to stimulate the growth of engineering, itself a considerable consumer of brown coal either directly or as electricity. Other consumers are the paper, textile, brewing, distilling and brick industries. The most important and characteristic use is however in the manufacture of chemicals. Within the Halle-Leipzig district there is some regional differentiation of the chemical plants based on brown coal. The plants for obtaining tar and oils from coal are located on the richer Eocene coals which are found in all but the northeast of the district. The installations of the Leuna works, just east of the Geiseltal field, are probably the best known. On the other hand, those chemical works requiring large quantities of electricity for making chlorine,

caustic soda and similar products, seek the cheaper, and therefore normally the poorer, coals. Of this nature are the many works of the Bitterfeld district, which include the great dyestuff and photographic material factories of the Agfa firm. It may be noted that the industries of the brown coal field are not found crowded together and surrounded by a dense mass of workers' housing like the industries of the older bituminous coalfields, but like the brown coal pits that supply them, are dispersed widely over the land, often with a planned housing estate for their workers beside them.

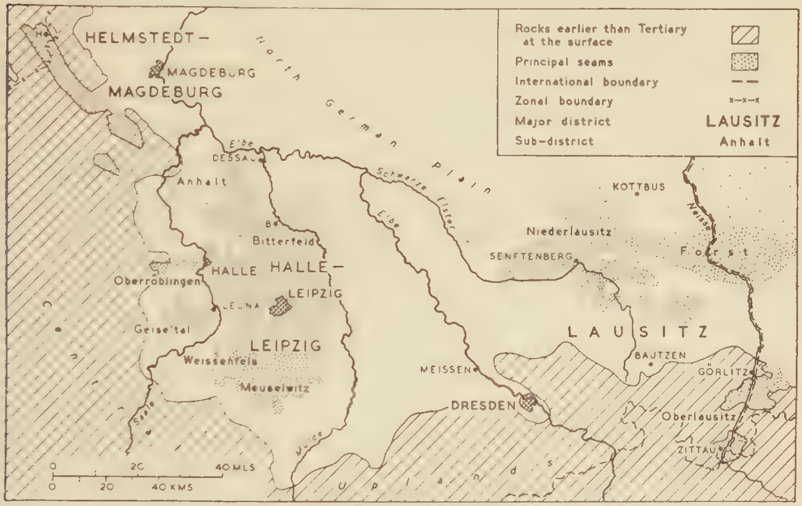

Fig. 3.—The Central German brown coal districts.

The Helmstedt-Magdeburg district resembles the Halle-Leipzig district in the nature of its coal and its agricultural development, but is of much less importance. The Eocene coal is found in a number of basins trending from southeast to northwest in the Harz foreland. Here again the use of brown coal in the sugar, engineering and chemical industries is of long standing. The northwestern extremity of the district, near Helmstedt, passes into the territory of the Federal Republic, the zonal boundary actually passing through one of the pits.

The third of the great producing districts is the Lausitz. This includes the isolated basins of the fringe of the Bohemian massif near Zittau, and the more widespread deposits in Lower Lausitz, of which the centre is Senftenberg. The district has evolved more slowly than the rest of Central Germany, and has developed fewer industrial uses for the coal. The Miocene brown coal is not suited to most chemical processes, although a Fischer-Tropsch plant was set up in the war years. The district has accordingly concentrated on the making of briquettes, especially in Lower Lausitz, which was well placed to supply the great Berlin market. The Miocene seam of Lower Lausitz is in fact present beneath much of the North German

Plain as far as Berlin, and continues eastwards into Silesia and what is now Polish territory, although mining conditions are normally less favourable.

The importance of brown coal in the economy of the " German Democratic Republic " in the Eastern Zone of Germany can scarcely be overemphasised. Bituminous coal resources are small and poor; not only must brown coal be the main source of heat and electricity but it must also continue, as during the war, to be the source of the fuel oil and chemicals that cannot be imported. It is not surprising, therefore, that the extension of brown coal mining is a prominent feature of the current Five Year Plan.

Brown Coal Mining and the Landscape

Open cast mining in Germany is at once more privileged and more rigidly controlled by the State than similar mining in this country. It is accepted that as high a proportion of coal as possible must be extracted and used for the common good. To this end, not only can mining concerns acquire, compulsorily if necessary, whatever open land is needed for mineral extraction, but they can acquire and sweep away buildings and even whole villages, and can divert roads and railways. It must also be remembered that in Germany the ownership of brown coal, as of most minerals, is divorced from the ownership of land. Mineral concessions are allocated by the State in regular blocks, which ignore whatever pattern of ownership may happen to exist on the surface. The result of all these provisions is firstly to ensure a radical transformation of the landscape by mining, with roads, railways and even villages transferred to fresh sites. Secondly it ensures that the transformation is remarkably complete: mining can proceed regularly over wide areas without interruption by change of ownership, and the amount of unworked land supporting roads, railways and villages is reduced to a minimum.

In return for these sweeping privileges, however, the industry is obliged to accept an obligation to reduce permanent damage to the land to a minimum. For example, as early as 1932 there were local regulations governing the levelling of open-cast workings, and these regulations have been re-issued and strengthened at various dates since by the Prussian and Reich governments. The regulations for example discourage the heaping of overburden in spoil banks in favour of orderly spreading in worked pits, irrespective of who owns them. They provide for the preservation of top-soil where this is of good quality, for the restoration of the land to agriculture or forestry, and for the proper supervision of the work. A continuation of this policy can be seen in the creation in 1950 of a special Land Planning Authority for the Rhenish brown coal district and the establishment of a fund to finance certain joint projects of land restoration by a levy on coal produced.

Today, well grown woodland covers the earlier workings of the Rhenish district, and more recently restored surfaces are disappearing under lines of young trees, mostly poplars, or, less frequently, are

being restored to agriculture. The result of this thoroughness of mining and restoration is therefore the creation of a new landscape, where not only roads, railways and villages, but the very contours of the land itself, have been refashioned by the hand of man.

THE STUDY OF LOCAL GEOGRAPHY AS AN INTEGRAL PART OF THE SCHOOL COURSE

E. W. H. Briault*

THERE is a widespread agreement on the importance of the study of local geography as an essential part of a good school course. This local study, however, is often not integrated with other parts of the school geography course, and some of its value is thereby lost. In practice, in England at any rate, local geography is often given less time in the course than it deserves or than geography teachers would generally acknowledge that it ought theoretically to occupy. This is partly because teachers are concerned, and rightly concerned, to pay sufficient attention to the study of the home country, of many other important parts of the world, and of aspects of world geography. This concern, together with limitations of time-table time, sometimes results in the curtailing of the study of local geography.

Local study is of great value for the following reasons, among others :—

(i) It deals with subject matter which is fully realistic to the child and which does not depend for its realism on verbal or visual presentation in school.

(ii) It involves the child in gaining information at first-hand, and thus represents in a small way part of that exploration upon which all geographical knowledge initially depends.

(iii) It lends itself especially to informal and active techniques of learning, calling for individual and group investigations and reporting, and is less susceptible than most other aspects of geography to the danger of over-much lecturing by the teacher.

(iv) A particular aspect of the techniques of the study of local geography is the frequent use of large scale maps by the pupils.

(v) Aspects of local geography known to all the pupils in a group provide standards of scale and comparison which are of great value to the teacher when he is dealing with the geography of areas which must be studied second-hand.

As against these advantages, local study possesses obvious limita-

* Dr. Briault is Staff Inspector of Schools, London County Council, and co-author with Mr. D. W. Shave of the Association's publication, *Geography in the Secondary School*.

tions. Its content often lacks variety. In our great urban areas, for example, the vital processes of primary food production cannot be investigated at first-hand. In country areas on the other hand, industrial occupations may be absent and even farming operations limited in variety. A second danger is that time may be wasted in the study of details which are trivial and of subject matter which is without significance. This is a danger often met with in social studies. The geographer on the other hand lays claim to the study of a subject with a clear content of *significant* fact. Such a content undoubtedly exists in local geography ; but in order to ensure it, some bounds to local study need to be set and not overstepped. It is the thesis of this paper that local geography needs to be viewed in a proper relationship to the equally important study of the homeland and of the whole world, and that its study needs to be integrated with and not divorced from these other studies.

It is necessary at this point to define local geography as the study of a small area in which individual features and details of the physical and human aspects of geography can be investigated. By " a small area " is meant one which could be traversed on foot and studied with the help of large-scale maps, that is maps on scales not smaller than 1 : 80,000. It is further suggested that local study as thus defined may take three distinct forms in a school course :—

(i) the study of the immediate home or school area ;

(ii) the study of an area visited in a day excursion or during a school camp or holiday ;

(iii) the study, *without visit*, but by means of maps, printed matter, photographs, specimens and other material of an area of the same sort of size as those covered in (i) and (ii) studied in the same sort of degree of detail.

Ordinarily it is the first of these which plays the greatest part in a school course.

The investigation of the geography of the home area can either be arranged as a consecutive part of the course, or split up to form part of the work at a number of points in the course as a whole. Some school syllabuses provide for an intensive study of the locality at the stage when a boy or girl has just entered his or her secondary school, that is at 11+. Others place the work in the fourth or sixth year of the secondary school, at 14+ or 16+. Primary schools in school syllabuses provide for an intensive study of the locality at investigation of it with children aged 9+ or 10+, over a consecutive period lasting perhaps several months. The advantages of some such intensive and consecutive study are evident : a reasonably full and connected idea of the geography of the home area may be expected to be gained. It is suggested, however, that some of the value of local study is lost. A continuous and intensive study falls easily into the dangers of studying too long the trivial detail and the insignificant fact. The value of the local example as a standard of comparison is weakened in the years of the course other than that in which the local

study is done. The essential training in the use of maps is limited, as far as their actual use in the home area is concerned, to the period of the local study, and training in map reading at other stages in the course tends to be divorced from the reality which first-hand knowledge of the area gives to it. There is too much teaching of map reading as a pre-examination training; it is felt that boys and girls should rather learn to understand maps by actually using them as an aid to and means of investigating local, large-scale, geography at home or on holiday or in imaginative studies similar to such occasions.

The alternative to an intensive and continuous study of local geography at some period in the school course is to arrange the investigation of numerous aspects of local geography each at a different point in the course in connection with the study of topics linking the locality with the homeland and with other parts of the world. For example, the study of the topic "Bread" may give rise to the local study of wheat growing or flour-milling or bread-baking and distribution and will link the local aspects, whatever they may be, with studies of other wheat lands in the home country and in other lands, with the world supply and distribution of wheat, and possibly with the study of the bread foods of lands where wheat is not the staple bread grain. In a similar way the local stream may be studied as part of a topic reaching out to the great river lands of distant parts of the world. A school geography course arranged in this way would consist of the study of a number of topics, each on a concentric plan of local geography—homeland—world. The repetition of this pattern has the advantage of continually placing the child in his geographical setting. It continually involves the factor of differing scales. It continually calls for the use of large scale maps, of homeland maps and of atlases in conjunction with one another. It ensures that the advantages of local study are gained at all stages of the course. It may perhaps be felt that the study of the local area is disjointed. This may be overcome by a short consecutive study or bringing together at a late stage in the school course. But in any case the factual content of local geography is less important than its value in other ways, and provided that inter-relationships between elements of the local geographical landscape are continually looked for and stressed, the piecemeal study of the locality is felt to be warranted.

There are two important ways in which the treatment of the geography of the home area in connection with the study of a number of separate topics may be complemented and its disjointedness counterbalanced. The first is by the consecutive study of the local geography of an area visited on holiday or at camp. Many schools arrange a week or a fortnight of this kind, with children from the age of 10 upwards. An excellent opportunity is given, especially to children from our great cities, to study a country area at first-hand and to discover many of the geographical factors and relationships within a small area. Provincial schools frequently arrange school journeys to London.

Secondly, there is felt to be room for a much greater amount of large-scale study in connection with regional work necessarily confined within the classroom. The study of a region, especially a homeland region, which cannot be actually visited, is too often dependent solely on the textbook, the atlas and the teacher. It is suggested that a much more realistic and an educationally sounder approach is by means of what can amount to local study. For example, a map of part of South Wales on the scale of 1/63,360 will show most of the essential geographical features of the coalfield area. The characteristic relief and the clear-cut relationship to it of settlement, industry and communications can all be readily visualised from the map: map reading is then being done by the children as a means to geographical study. Pictorial material, which is an essential element in this sort of local study, should be introduced and probably in some cases first-hand material of other kinds will be used. Models, if true to scale, can also be valuable. A study of local geography, even if brief and incomplete, then precedes the more generalised study of a larger area, and the broad statements of teacher and textbook and the small-scale statements of the atlas are informed and enlivened by a more detailed and particular knowledge of part of the area under consideration.

In a school course arranged as a series of topics studied on a concentric plan, such an approach as this to the study of a region associated with a particular topic, can bring the advantages of local study once again into the course at numerous points. Just as the starting point of some home-area investigation helps to place the child in his geographical setting in his homeland and in the world, so some large-scale study of part of a distant region helps to make that region seem to the child equally to be the real home-area of other children. Geography in school should aim, among other things, at making the lives of people in other parts of the home country and in distant lands realistic and life-size. This aim is more readily achieved by large-scale studies of parts of those areas, by proceeding from the particular to the general, rather than by going straight away to broad generalisations.

It is, therefore, suggested that in two distinct ways, the study of local geography should be integrated with the rest of the school course: first, by the investigation of aspects of the local area in connection with the study of topics covering also the geography of parts of the homeland and of other lands and of the world as a whole; second, by the large-scale approach to regional studies. In these ways the school course may be expected to gain the advantages claimed for local study at all stages in the course. Subject matter becomes realistic; exploratory investigation is repeatedly called for; map reading is learnt by map use; standards of comparison and ideas of scale are continually refreshed. The child comes to have a sense of his geographical setting and to realise that every part of the world has its local geography for those who live there.

ESSENTIALS OF A GOOD SECONDARY SCHOOL ATLAS

(for age range 11–16 years).

Memorandum by the Committee of the Secondary Schools Section of the Geographical Association.

Of all textbooks used in geographical teaching none compares in importance with the atlas, and, although there are available in this country a number of good atlases, wherever geography teachers meet to discuss the problems of their school work criticisms are always heard of the atlases at present found in schools.

The Committee has therefore spent considerable time in the past two years in an endeavour to study the criticisms usually made and to offer suggestions for the improvement of the secondary school atlas. It was found that many of the criticisms tend to cancel each other out ; the personal tastes and desires of teachers differ so widely that it is unlikely that the following suggestions will meet with anything like universal approval. At the present time also, even if teachers were unanimous on the matter, high costs would discourage publishers from endeavouring to meet their wishes by the production of an entirely new school atlas.

However the Committee presented a memorandum on this subject to the Annual Conference of the Association in London in January, 1952, which was attended by a very large gathering of teachers as well as by representatives of several well-known publishing firms. As a result of the discussion at the Conference a few modifications have been introduced into the memorandum which is now offered to teachers, publishers, and others interested as an indication of what the majority of the committee feel to be desirable in any new atlas for pupils under the age of 16 in English Secondary Schools.

SIZE AND BINDING.—The atlas should measure approximately 10 × 9 inches, should be strongly bound, and should open flat.

INDEX.—This is an essential part, which should include all place names appearing on all the maps, with latitude and longitude in degrees and minutes.

SYMBOLS.—As far as possible, these should be consistent throughout the atlas. Lines used for roads, railways and rivers should be easily discernible and sufficiently distinguishable from one another.

PLACE NAMES.—These should be :—

(*a*) Fewer than commonly shown in atlases currently published ; possibly selected from and confined to place names most commonly referred to in reliable textbooks in current use.

(*b*) Clearly and consistently related to the symbol indicating the position of the place named.

(*c*) Spelt according to accepted English usage, with, in brackets and smaller type, the local names, transcribed where necessary, of large or important towns.

(*d*) Shown on large-scale inset maps for regions of dense population or special importance.

Colours.—These should be :—

(*a*) Clear and aesthetic, and not garish.

(*b*) As far as possible, consistent in application in relief on all maps.

(*c*) Continued beyond political boundaries to the edge of the map frame.

(*d*) Used in graduated shades of a single colour to show quantitative distribution (e.g., of temperature, rainfall).

The boundaries between different shades of a colour should not be reinforced by a drawn line. Land below sea-level should be distinguished by stippling.

Projections.—All world maps should be on an equivalent projection except the route map which should be on Mercator's projection. A page of diagrams should show the characteristics of all projections used in the atlas.

World Maps.—It is suggested that world maps of certain important distributions would give sufficient detail to allow separate continental distribution maps to be dispensed with, e.g., for such distributions as :—

(*a*) Physical features (double page).

(*b*) Temperature : (i) January isotherms (sea-level) superimposed on layer-colouring showing actual temperatures ; (ii) July isotherms, as for January. (1 page each.)

(*c*) Rainfall : (i) mean annual rainfall ; (ii) seasonal rainfall. (1 page each.)

(*d*) Winds and ocean currents (two single page maps showing seasonal variations).

(*e*) Vegetation of, say, ten types, e.g., tundra, coniferous forest, deciduous forest, temperate grassland, Mediterranean, desert, semi-desert, tropical grassland and savana, monsoon forest, and equatorial forest. (Double page).

(*f*) Density of population. (Double page).

(*g*) Political boundaries, showing countries, capitals, and other large cities. (Double page).

(*h*) Routes : continental railways and highways, sea routes and ports, air routes and ports. (Double page).

Other Maps.—Preferably single-page, except where suggested otherwise below. Each map should show physical features, railways, important cities and political boundaries.

(*a*) British Isles : (i) physical ; (ii) geological, indicating rock types rather than periods ; (iii) rainfall ; (iv) Ireland ; (v) Central Lowlands of Scotland ; (vi) Southeast England ; (vii) Southwest England ; (viii) Wales ; (ix) Midlands ; (x) East Anglia ; (xi) S. Lancashire and W. Yorkshire ; (xii) Northern England (six counties)

(*b*) Central Europe, west of U.S.S.R. (Double page).

(*c*) Mediterranean region. (Double page).
(*d*) France.
(*e*) Southern Scandinavia.
(*f*) U.S.S.R. (Double page).
(*g*) Near East (Egypt to Persia).
(*h*) Far East.
(*i*) Indo-Pakistan.
(*j*) North America. (Double page).
(*k*) St. Lawrence basin and north-eastern U.S.A.
(*l*) South America.
(*m*) Central and South Africa.
(*n*) Australia.
(*o*) Southeast Australia.
(*p*) New Zealand.
(*q*) Polar Regions. (Half-page each).

Local Maps.—Local editions of the atlas, are desirable, containing a map of the requisite county or region. This map should show physical features, towns and communications.

OBITUARY

L. B. Cundall.

Leonard Cundall had been a very active member of the Association throughout his teaching life. Whether at meetings of the London Branch or at the January Conferences his direct and incisive speech compelled attention ; and he left no doubt in the minds of his hearers of the importance he attached to Geography as a factor in Education.

Apart from his long service as a Geography teacher his practical devotion to his subject was shown by his textbooks, his contributions to *Geography*—notably the sets of Climatic Statistics laboriously collected from the archives of the Meteorological Office over a series of years, his part in the production of the I.A.A.M. Handbook on the "Teaching of Geography" and his Chairmanship of the Secondary Schools Section of the Association from 1937 to 1946.

His many friends who have collaborated with him in these and other efforts and enjoyed his stimulating company will miss him sadly.

C. B. Thurston.

Mr, Cundall had visions of a Geographical Association including all persons who teach or study geography and he was always concerned to increase our membership and our branches. Part, a very large part, of this enthusiasm arose from his belief in geography as an instrument to promote international understanding. In pursuit of this idea Mr. Cundall tried to co-operate with continental teachers of geography to found an international geographical association. Organisational difficulties led to reconsideration of the plan, though our Association has since been instrumental in founding an Inter-

national Conference of Geographical Associations which held its first meeting in Sheffield in 1951 and proposes to hold its second in Holland in 1954.

The Association and its members wish to offer their tribute of respect to a very active and enthusiastic fellow worker.

H. J. FLEURE.

H. J. WOOD.

Dr. H. J. Wood, for many years senior assistant in the Department of Geography, King's College, London, died suddenly in October. He graduated originally from the Joint School of Geography at King's College and the London School of Economics and served first for a period on the staff of the Geography Department of Glasgow University. Returning to King's College in 1930 he began to take a large share in the senior teaching, concerning himself particularly with North America, the history of geographical discovery and historical geography. Not only in the teaching of these courses but in a wide sphere of administrative work he became a well-loved and indispensable member of the Joint School staff. He will be remembered also for his services to the Association as Conference Organiser for the January meetings. His published work includes his valuable Agricultural Atlas of Scotland, his papers on California which arose from his visit as a Commonwealth Scholar in 1935 and his writing on geographical discovery and exploration, represented by his recently published book. He was actively engaged on further work in this field at the time of his death, and it is hoped that it will be possible to complete it for publication.

Dr. Wood's quiet and unaggressive temper meant that his voice was seldom heard in debate nor did he ever press his own views at the expense of those of others. Those who knew him best, however, realised that he was a scholar, a man of mature mind and a most admirable colleague, and he will be greatly missed at King's College.

S. W. WOOLDRIDGE.

FRANCIS GRAVE MORRIS

Francis Morris died suddenly on 19th September, 1952, while on holiday in Ireland and, with his passing, the Association has lost a very staunch friend.

He was a graduate of Oxford and of London and, after holding a number of teaching posts, he was appointed to a lectureship in geography in the University of Durham, where he served with distinction for some 14 years, acting for several years as Senior Tutor of King's College. During the last war, he commanded the Artillery Section of the Durham University Officers' Training Corps.

In 1946 he was appointed to a lectureship in geography in the University of Bristol, and at once fitted happily into his post. His interests lay chiefly in the field of historical geography and his studies had taken him to America as Rockefeller Foundation scholar, where he worked chiefly at Harvard. He was later awarded a Leverhulme

research fellowship. With his passing we have lost not only a loyal and learned colleague but a very dear friend. His last act was typical of the man for, by his will, he left the residue of his estate upon trust to his wife for life and then to the University of Bristol, expressing the desire that it be used for the foundation of a Research Fellowship in Geography at this University. W. W. J.

CORRESPONDENCE

Sir,

The following article was printed in the *Bindyite*, the magazine of Dubbo High School, N.S.W., which I received to-day. The school is one in which I taught, while on exchange, in Australia last year. The writer, G. Peacocke, Class 3A, is about 14½ years old, and I feel that what he has to say about the marshes would be of interest to many readers of *Geography*. MARGARET POWELL.

The Park School,
Preston, Lancs., 22nd November, 1952.

THE MACQUARIE MARSHES

Many students of the Dubbo High School have heard of the famous Macquarie marshes, but few have seen them or the wonderful wild life which is found in such abundance in this, perhaps most important and valuable sanctuary and breeding ground in New South Wales. I will, therefore, endeavour to give readers of the *Bindyite* some idea of what is comprised in the marshes, which the Sydney press has called " The Wonderland of the West."

The following is based on information given me by my father who has had the marshes under his supervision for 28 years and knows the sanctuaries extremely well and is acknowledged as the leading authority on the area and its wild life.

The marshes have a considerable historic interest. It was at Lake Willancora, near the south boundary of the southern marshes that the explorer, Oxley, encountered the vast reed-beds. He decided that he was on the margin of an inland sea and that it was little use trying to proceed any further, and so he abandoned his exploration along the Macquarie.

The explorer Sturt also mentions the Macquarie marshes in his journal, which is now in the Mitchell Library. Sturt found them practically impassible and like Oxley thought that he was on the edge of an inland sea.

The explorer Hume left the Macquarie and struck northeast to discover the Warrumbungle mountains and the vast plains between the Macquarie and these mountains.

The Macquarie marshes are in two sections and comprise about 44,000 acres from about 60 to 90 miles below Warren. They are in a sanctuary declared under the Birds and Animal Protection Act, 1918–1930 (now the Fauna Protection Act, 1948), and comprise lakes,

lagoons, swamps and vast open beds of reeds, in many places up to 15 feet high. The land is level and the greater proportion plain, with coolibah or heavy green red gum forest.

Where the Macquarie river enters the marshes it breaks up into canals which spread far and wide threading their way through reed-beds, water forests, plains, swamps and lagoons, until they once more unite in a single channel below the marshes. On a summer morning, with wide expanses of water meadow, edged with green reed beds spreading, with coolibahs and gum trees, myriads of birds fly everywhere in countless numbers, or swim, or rest, or wheel against the blue sky.

Ornithologists, Messrs. Roy Cooper, J. L. P. Ramsey and N. Chaffer in a brief visit to the marshes in 1948, classified 139 different species, and admitted that there would be many more species present, but time would not allow them to be classified.

Many species of birds in the marshes are of great value, especially the three species of ibis, which breed there in vast numbers—the white, the glossy, and the straw-necked. These birds destroy enormous numbers of grasshoppers and are probably the most valuable insectivorous birds in Australia. There are also many species of birds breeding in the marshes that do not fall short of the ibis in worth. Also many other rare and beautiful birds breed here and they are of scientific interest.

Various species of kangaroo are abundant there, opossum, water-rats, and wild pigs. There are plenty of fish in the streams.

Because there are so many useful birds breeding there, the Macquarie marshes are of enormous value to farmers and graziers. They are of more use as a sanctuary and breeding place than they would ever be for grazing or agricultural use. The various Governments in the past have wisely realised this and resisted all attempts to make the land available for any kind of settlement which would be detrimental to the wild life. The present Government is considering schemes by which by the aid of embankments and dams, sufficient water may be kept in the marshes to supply all requirements of bird life after the Burrendong Dam is built.

Much more could be written about the Macquarie marshes but I hope that many of our readers may some day see these wonders for themselves.

G. Peacocke, Class 3A.
(age about 14½).

G.A. SUMMER SCHOOL, 1953

Practical Field Techniques in Geographical Study and Teaching

A course will be held at Lodge Hill, Pulborough, Sussex, from August 24th to September 4th, organised by Professor S. W. Wooldridge of King's College, University of London, and Dr. E. W. H. Briault, L.C.C. Education Authority Staff Inspector. Intended particularly for teachers and students of geography, the course will include regional field work in the Weald and demonstrations of method in outdoor geography for local studies. A number of the excursions will be made on foot.

Early registration on the form included with this issue is necessary, as the number of places is limited to about 55.

GEOGRAPHICAL ASSOCIATION

Annual Report, 1952

This is the first report for a full year relating to the period ending August 31st. The year has been marked by outstanding successes but offset by some disappointments.

We must first place on record our deep sense of sorrow in the loss during the year of so many distinguished geographers, teachers, and friends of the Association. Sir Richard Gregory was a former president; Professor Fawcett a most valued member of both Council and executive committee for many years; Mr. Cundall and Dr. Wood, Mr. Ernest Young and Dr. Holland, were all staunch friends of the Association who gave devoted service and to the teaching of geography. And with their names this list is not completed—as the record of obituary notices in our journal makes all too clear.

With his wide experience and knowledge of African affairs it was perhaps inevitable that our President, Professor Debenham, should have been asked to undertake work for the Colonial Office in Africa which prohibits his attendance at the Annual Conference. We are grateful to him for the efforts he has made to attend meetings of the executive committee, Council, and the Spring Conference during his period of office, and we look forward to hearing his postponed presidential address in the course of the forthcoming Spring Conference.

Members will welcome with special pleasure our incoming President for 1953. With reference especially to his work for the British Association, Dr. Howarth has helped to guide geography through many shoals during the past fifty years, and we are fortunate in having as our President a geographer who can review from a wider horizon than is often possible both the progress of our subject and the geographers with whom that progress has been associated.

We are very glad to report further improvement in our membership. On August 31st we had 3,092 full members of whom 598 were student members. (These figures compare with 2,994 and 576 in August, 1951.) We urge our members to do all in their power to see that this trend continues.

From the audited balance sheet that we are now able to present to the Annual Meeting, it will be seen that despite this increase in membership, our income from members' subscriptions now meets little more than half of the burden of costs that our Association faces each year, and the officers of the Association have somehow to find considerably more than one thousand pounds to meet our annual expenses. Grateful thanks for the help that has been given in solving this acute problem must be extended to Dr. Balchin, our Annual Conference organiser (whose profits from the publishers' exhibition last year surpassed all records) and Dr. Margaret Davies, whose generous help contributed substantially to a surplus being made on the Summer School. Our office staff at headquarters have worked indefatigably, under Miss Oughton's direction, and have again added substantially to our income by the profits from sales of publications and maps, advertisements, etc. From many of our members, too, we have reaped the first harvest of a repayment of Income Tax, for subscriptions paid under covenant. May we appeal to members generally to extend the latter more widely, as a matter of real urgency and one of practically no cost to the member. If only 500 additional members would agree to pay subscriptions under covenant in this way we should be freed from the need to consider increases in subscriptions, which otherwise may well have to come.

We are especially grateful, also, to those members who from time to time have made gifts to the Association as listed in the pages of *Geography*. The Honorary Secretary is glad of this opportunity to place on record the thanks of the Association to each one of them, and especially to Mr. Fairgrieve, who has generously placed at her disposal a sum to cover a personal guarantee made earlier by him, against loss on one of our special publications.

The record of the year's activities is a notable one. The Spring Conference held at Tenby was a very happy and instructive venture, despite the distance and high costs of this centre. A very warm vote of thanks is due especially to Professor Bowen for organising this conference. The Summer School at Rhoose, under the direction of Dr. Margaret Davies, was also a great success. We were very sorry that two such ardent field workers as Dr. Briault and Professor Wooldridge were unable after all to participate in the Summer School, owing to their absence at the time in America. Already, however, plans are being made for them to direct a Summer School to be held next year in Sussex, expressly for the demonstration of field techniques.

In our endeavour further to promote the mutual interests of British and transatlantic teachers of geography, plans are being worked out at headquarters

for the exchange of membership and publications between the American Council of Teachers of Geography and the Geographical Association.

The various section committees have continued to work actively and the *Secondary Schools Section Committee* is to be congratulated on the progress made in the report on the content of School Atlases. It is with real regret that we learn that Mr. Thurston is to relinquish the chairmanship of this Section, an office he has held for over 25 years. The Association gratefully acknowledges the debt it owes to his pioneer work and service for all teachers of geography. To Mr. Goodson, who is retiring from the office of Honorary Secretary of the Section, our warmest thanks are extended for his invaluable services over many years.

The *Training College Section Committee* has again held three well attended one-day conferences, and continues organised research into children's reactions to geographical pictures.

The *Primary Schools Section Committee* has continued its discussions on sample studies in primary school geography and has begun a compilation of suggested studies with relevant source lists. To Mr. Murphy, who retired from the office of chairman of the committee early this year, we gladly express our appreciation of his work for this section.

The *Public and Preparatory Schools Section Committee* reports further meetings held during the year and efforts to increase membership of the parent Association.

Activities of the *Standing Committee for Visual Aids in the Teaching of Geography* have again been vigorous and wide ranging, particularly in collaboration with the National Committee for Visual Aids. Work on the pamphlet dealing with the planning and equipment of the Geography School Room, largely prepared by this Section, nears completion and it is hoped to publish the pamphlet shortly. Further progress is also reported towards preparing for publication a statement on the making of Geography Film Strips.

The *Standing Committee for Urban Spheres* reports a further year of consolidation with attention directed especially to work in Herefordshire, Gloucestershire, Dorset, Hampshire, Berkshire, Buckinghamshire and Hertfordshire.

Branch activities have been well maintained, and fifty branches still operate. Some have closed during the past year, but new or revived branches have been opened in Brighton, Shropshire, South Wales (East) and Worcester, while there are possibilities that new branches or revived branch activities may develop at Reading, Glasgow, Southampton and Bournemouth. We again urge members to support local branches where these exist and to be watchful for opportunities to create new ones where appropriate.

The burden entailed by the editorial work of the Association in the production of *Geography* and our special publications is probably not always appreciated. Professor Linton, our Honorary Editor, has given notable service to us for six years and with reluctance has had to ask that some arrangement be made to lighten his load. After discussions by a committee set up for the purpose, new editorial machinery has been devised and will come into operation in 1953. We are glad to be able to report that Professor Linton has agreed to continue in office as the Honorary Editor, but he will now be supported in this work by a panel of assistant editors who will share much of the routine work. This panel includes the names of Dr. Briault, Mr. Pye and Dr. Wise. The Honorary Editor hopes that these measures will make possible the much more expeditious handling of authors' manuscripts and permit the introduction of new features to our journal that he has long desired but lacked the means to achieve.

At headquarters, in collaboration with Sections and other members and officers, work has proceeded on revisions of our existing publications. A revised edition of *Geography in the Primary School* is about to be published. Geological map overlays for the O.S. map sets have been reprinted and are now on sale; revision of the notes to accompany the map sets has been undertaken and new notes should be published in a few months' time. The leaflet on university entrance requirements has been brought up to date and reprinted.

In concluding this report, the Honorary Secretary expresses sincere thanks to the many members of Council and of our Executive Committee who have given so generously of their time and energy to the Association's affairs, including the members retiring from Council, Mr. P. R. Heaton, Mr. D. A. Hill, Dr. M. J. Wise and Professor S. W. Wooldridge, and from the Executive Committee, Mr. Heaton and Professor Wooldridge. To our Assistant Secretary at headquarters, Miss Marguerita Oughton, the warmest thanks are due in very special degree for her devoted service to the Association, in times beset with difficulties.

ALICE GARNETT, *Hon. Secretary.*

Dr. ACCUMULATED FUND—INCOME AND EXPENDITURE ACCOUNT. Year ended 31st August, 1952. Cr.

1951 for 8 mos. £		£ s. d.	£ s. d.
	To *Geography*		
728	Printing and Publishing	1,121 5 1	
31	Blocks	58 1 8	
61	Postage	96 6 0	
820			1,275 12 9
	SPECIAL PUBLICATIONS		
	Stock at 1st September, 1951 ..	197 14 9	
	Printing	41 2 2	
		238 16 11	
10	*Less* Stock on hand 31st Aug., 1952	161 19 3	76 17 8
151	,, Printing and Stationery		258 17 8
13	,, Addressograph		16 3 1
—	,, Insurance		8 10 0
486	,, Salaries and National Insurance		734 3 6
78	,, Postage—General		147 10 8
8	,, Sundry Office Expenses		9 17 3
10	,, Library Expenses		4 5 11
15	,, Telephone		15 16 2
7	,, Bank Charges		16 1 0
62	,, Officers and Standing Committee Expenses ..		91 1 7
2	,, Donations and Subscriptions		15 0
20	,, Accountancy Charges		30 0 0
26	,, Subventions to Branches		16 1 0
—	,, Depreciation of Office and Library Furniture and Equipment		17 0 0
£1,708			£2,718 13 3

1951 for 8 mos. £		£ s. d.	£ s. d.
269	By Sales of Publications, etc. and Royalty		198 6 6
27	,, Sales of Special Publications		236 5 6
212	,, Advertisements		325 15 3
13	,, Returned Library Postages		35 2 8
27	,, Closed Branches—Surplus Funds		—
	,, SUBSCRIPTIONS		
949	Current	1,531 0 2	
—	Refund of Income Tax on Covenants	53 14 4	
12	Arrears	23 17 0	
961			1,608 11 6
	,, INTEREST ON INVESTMENTS AND BUILDING SOCIETY DEPOSITS (including Investments and Deposits held in Life Membership and Jubilee Funds)		
102	On Investments (gross)	94 1 8	
16	On Building Society Deposits ..	26 9 3	
118			120 10 11
39	,, Surplus on Conferences, less amount allocated to General Reserve		23 16 9
3	,, Gifts		27 16 0
—	,, Transfer from Miscellaneous Maps Income and Expenditure Account		85 14 7
39	,, Balance, being Deficiency for the year carried to Accumulated Fund		56 13 7
£1,708			£2,718 13 3

Dr. MISCELLANEOUS MAPS ACCOUNT—INCOME AND EXPENDITURE ACCOUNT. Year ended 31st August, 1952. Cr.

1951 £		£ s. d.	£ s. d.
	To Stock at 1st September, 1951 ..	379 12 3	
	Less Transfer to Special Publications Account	137 0 0	
362			242 12 3
39	,, Maps and Pictures purchased..		56 2 8
—	,, Stationery and Packing		3 13 10
2	,, Postages, Sundry Expenses, etc.		4 2 3
—	,, Depreciation of Duplicator		4 16 5
—	,, Transfer to Income and Expenditure Account. Cost of Special Publications		85 14 7
182	,, Balance, being Excess of Income over Expenditure transferred to Publications Reserve Fund ..		43 11 7
£585			£440 13 7

1951 £		£ s. d.
205	By Sales	232 10 4
380	,, Stock at 31st August, 1952	208 3 3
£585		£440 13 7

THE GEOGRAPHICAL ASSOCIATION

BALANCE SHEET. 31st August, 1952.

1951 £		£ s. d.	£ s. d.	£ s. d.
	ACCUMULATED FUND			
	Balance at 31st August, 1951		393 2 5	
	Less Deficiency for the year as per Income and Expenditure Account..		56 13 7	
563			336 8 10	
170	*Less* Transfer to Life Membership Fund ..	—		
—	Transfer to Jubilee Fund	87 6 1		
—	Transfer to Herbertson Memorial Fund.. ..	7 12 8	94 18 9	
393				241 10 1
—	GENERAL RESERVE		.. .. ..	80 0 0
30	SUBSCRIPTIONS PAID IN ADVANCE ..		155 2 0	
477	SUNDRY CREDITORS		552 7 2	707 9 2
900				1,028 19 3
	PUBLICATION RESERVE FUND			
940	Balance at 31st August, 1951		1,121 15 4	
181	*Add* Surplus on Map Sales Account ..		43 11 7	
1,121				1,165 6 11
	LIFE MEMBERSHIP SUBSCRIPTION FUND			
2,029	Balance at 31st August, 1951		2,237 19 3	
39	*Add* Subscriptions received during the year		219 3 0	
170	Value of 3% Defence Bonds re-transferred from Accumulated Fund ..		—	
2,238				2,457 2 3
£4,259	Carried forward			£4,651 8 5

1951 £		£ s. d.	£ s. d.	£ s. d.
	ACCUMULATED FUND ASSETS			
160	SUNDRY DEBTORS		275 16 7	
16	STOCK OF SPECIAL PUBLICATIONS.. ..		161 19 3	
	OFFICE AND LIBRARY FURNITURE AND EQUIPMENT			
	Estimated value 31st August, 1951..	150 0 0		
	Additions during year ..	20 0 4		
		170 0 4		
	Less Depreciation.. ..	17 0 0		
150			153 0 4	
	INVESTMENT, at par—			
200	£200 3% Savings Bonds 1965/75 .. (Market Value 31st August, 1952, £168)		200 0 0	
8	CASH IN HAND	2 17 0		
345	CASH AT BUILDING SOCIETY	182 3 0		
21	CASH AT BANK	53 3 1		
900			238 3 1	1,028 19 3
	PUBLICATION RESERVE FUND ASSETS			
	DUPLICATOR at cost.. ..	32 3 2		
	Less Depreciation.. ..	4 16 5		
32			27 6 9	
424	STOCK—Map Sets		208 3 3	
32	SUNDRY DEBTORS		23 19 9	
633	CASH AT BUILDING SOCIETY	796 19 10		
—	CASH AT BANK	108 17 4		
			905 17 2	
1,121				1,165 6 11
	LIFE MEMBERSHIP SUBSCRIPTION FUND ASSETS			
	INVESTMENTS, at par—			
	£1,646 4s. 2d. 3% Savings Bonds 1965/75	1,646 4 2		
	£300 3% Savings Bonds 1955/65	300 0 0		
	£170 3% Defence Bonds .. (Market Value 31st August, 1952, £1,830 2s. 10d.)	170 0 0		
2,116			2,116 4 2	
122	CASH AT BUILDING SOCIETY	82 19 1		
—	CASH AT BANK	257 19 0		
			340 18 1	
2,238				2,457 2 3
£4,259	Carried forward			£4,651 8 5

THE GEOGRAPHICAL ASSOCIATION

BALANCE SHEET—*continued.* 31st August, 1952.

1951 £		£	s.	d.	£	s.	d.
4,259	Brought forward				4,651	8	5
	JUBILEE FUND						
820	Balance at 31st August, 1951	820	0	0			
—	*Add* Transfer from Accumulated Fund	87	6	1			
820					907	6	1
	HERBERTSON MEMORIAL FUND						
282	Balance at 31st August, 1951	282	5	10			
—	*Add* Interest for the year	7	14	2			
—	Transfer from Accumulated Fund ..	7	12	8			
282		297	12	8			
—	*Less* Lecture Expenses	25	0	0			
282					272	12	8
£5,361					£5,831	7	2

1951 £		£	s.	d.	£	s.	d.	£	s.	d.
4,259	Brought forward							4,651	8	5
	JUBILEE FUND ASSETS									
	INVESTMENT, at par—									
820	£820 3% Savings Bonds 1965/75 .. (Market Value 31st August, 1952, £688 16s.)				820	0	0			
—	CASH AT BUILDING SOCIETY				87	6	1			
820								907	6	1
	HERBERTSON MEMORIAL FUND ASSETS									
	INVESTMENT, at par—									
250	£250 3% Defence Bonds 1965/75 .. (Market Value at 31st August, 1952, £210)				250	0	0			
32	CASH AT BUILDING SOCIETY	10	2	8						
—	CASH AT BANK	12	10	0						
					22	12	8			
282								272	12	8
£5,361								£5,831	7	2

We have audited the above written Balance Sheet dated 31st August, 1952, and certify that in our opinion it is properly drawn up so as to exhibit a true and correct view of the position of the Association at that date, according to the best of our information and the explanations given to us, and as shown by the books of the Association.

28th November, 1952.

W. N. HIMBURY,
Hon. Treasurer.

HOLMES, WIDLAKE & GIBSON,
Chartered Accountants,
SHEFFIELD

Gifts to the Association

We record with gratitude the receipt of donations, some made under covenanted agreement to pay for seven years, in response to the Association's appeal for financial help, as follows :—

(May, 1952 to January, 1953)

	£	s.	d.
Sir William N. Himbury	25	0	0
Miss E. M. Coulthard	8	0	0
Mr. L. Brooks (first covenanted donation)	6	0	0
Mr. C. B. Moller (first covenanted donation)	1	18	0
Miss H. C. Lamb (first covenanted donation)	1	3	10
Miss G. Freeth	1	0	0
Miss O. Garnett		10	0
Miss K. Gribble		10	0
Mr. J. R. Wilding		10	0
Prof. G. Manley		9	0
Miss M. B. Carr		7	6
Miss E. M. Dawson		7	6
Mr. D. Young		5	0
Mr. J. H. Beck		2	6
Mr. A. Blue		2	6
Mr. M. Colwill		2	6
Mr. F. R. Chappell		1	0

To Mr. A. H. Done we are greatly indebted for the gift to the library of a copy of *Bartholomew's Physical Atlas, vol. III, Meteorology*, 1899.

Spring Conference, 1953

Members who wish to attend the Spring Conference at Lincoln should make early application according to the instructions in the programme included with this issue of *Geography*.

Branch News

An attempt is to be made to initiate branch activities at Reading and members in that neighbourhood who would be interested in participating in these are advised to write to Mr. P. D. Wood, Department of Geography, The University, Reading. We are grateful to the Department of Geography at Reading for its efforts to establish this new branch.

B.B.C. School Broadcasts

It is hoped to form a panel of regular listeners to School Broadcasts in geography and travel amongst members of the Geographical Association. Members of this panel would undertake to listen to and report on as many broadcasts as possible during the current school session.

Will any teachers able to help in this way please get into touch with the Honorary Secretary at headquarters ; representatives of interests in all types of schools are needed.

Congratulations

Warm congratulations are extended to Dr. P. R. Crowe, Reader in Geography in London University and head of the Department of Geography at Queen Mary College, on his appointment to the chair of geography at the University of Manchester.

The British Ship Adoption Society

On 1st December, 1952, the address of the British Ship Adoption Society was changed to : H.Q.S. Wellington, Victoria Embankment, London, W.C.2. H.Q.S. Wellington is the Headquarters of the Honourable Company of Master Mariners and it is upon their invitation that the Society has transferred its offices. Teachers from member schools will be warmly welcomed on board where there are many things of interest to be seen.

The Imperial Institute

We have received at headquarters information of new exhibits and teaching aids added to the Imperial Institute's Galleries and facilities. New relief-model maps have been introduced to the Courts of Trinidad, Tobago, Jamaica, Gibraltar, Mauritius, Hong Kong and Aden in the Exhibition Galleries. Other additions

include new dioramas and "story exhibits." It is hoped to make visits by school parties to the Institute more fruitful by the provision of a class-room fitted with demonstration apparatus; and by the presence of an Educational Adviser, who is an experienced geography teacher seconded to the Institute by the L.C.C., who will be available to advise visiting teachers on the correlation of their schemes of work with visits to the Galleries and the project work that may be done at the Institute.

Other facilities include a lectures scheme, providing speakers for adult and school meetings; the slide and film-strip loan library, from which film-strip subjects in the form of 2 in. × 2 in. slides can be selected; "Story leaflets" of Empire commodities; Institute and other official and unofficial publications —charts, maps, posters, etc. Information of the Imperial Institute's services and facilities may be obtained from the General Secretary, Imperial Institute, London, S.W.7.

REVIEWS OF BOOKS

WITH very rare exceptions, books reviewed in this journal may be borrowed from the Library by full members or student library members of the Association.

Social Provision in Rural Wiltshire. H. E. Bracey. 14 × 22 cm. xix + 204 pp. London. Methuen & Co., Ltd. 1952. 21/-.

An informative survey, valuable not only for its intrinsic merit but for the presentation of social survey methods which workers in other areas will profitably study. There are three sections. The opening chapters provide a background summary of the physical and historical geography of Wiltshire, the middle section reports the results of the survey of commercial, professional, social, official and other services, while the concluding chapters offer an attempt to grade settlements in terms of the services they provide and also a detailed survey of a selected village. Particular interest will be aroused by the use of "an index of social provision" (ch. XI). Introduction of the term "territory" (p. 49) as an alternative to "urban field" or "sphere of influence" seems open to question but Bracey's conclusion that the pattern of villages comprises "service centres of varying size, importance and function . . . spaced at significant distances from each other" will be noted with interest.

The book is singularly well illustrated with maps. Logarithmic scales might have been used in the population graphs (Figs. 11–12). Unfortunately, in the attempt to include as much information as possible in a small volume, some sacrifice of style has been made. The production of similar surveys for other counties will be awaited with interest. M.J.W.

Suffolk. County Book Series. W. Addison. 14 × 22 cm. xii + 311 pp. London. Robert Hale, Ltd. 1950. 15/-.

Mr. Addison writes in an interesting and enthusiastic way of churches and village characters, country scenes and historical connections—indeed he does it so well that some of his enthusiasm must be communicated even to the most reluctant reader. This is as one expects, and geographers are used to sifting and searching for geographical facts in books such as this. One would think, however, that an account of one of our most important arable farming counties would warrant a more detailed description of fields and crops than the author gives—agricultural subjects are mentioned on but 18 pages out of 298, and then the main points of interest are Suffolk Punches and Red Poll cattle. Further, a suggestion that a separate map should illustrate each of the book's regional chapters may be a little too much for the layman, but it is certain that the one map in the book is inadequate. The illustrations, whilst mainly of architectural interest, are of a very high standard. R.T.C.

Lincolnshire and the Fens. M. W. Barley. 14 × 21·5 cm. viii + 191 pp. London. B. T. Batsford, Ltd. 1952. 15/-.

This is a further volume in the "Face of Britain" series, and maintains the Batsford standards of production and illustration. The author is a Lincolnshire

man, and writes with affection and insight of the land, people, towns and villages of his richly varied native county; his style is felicitous and his matter interesting. But, in spite of the title of the book, the Fens, apart from those in Lincolnshire, receive somewhat scant treatment; especially is this true of the southern peat fens. It is almost as though mention of the Fens outside Lincolnshire was an afterthought; and the book's single map is of Lincolnshire alone. If the Isle of Wight deserves a volume to itself in the series, so do the Fens.

B.H.F.

Wales. The County Book Series. Vol. I: The Background. Vol. II: The Country. Maxwell Frazer. 14 × 22 cm. xvi + 492 pp. London. Robert Hale, Ltd. 1952. 18/– each.

Volume I of this work is a queer conglomerate, full of faults and fossils. It is not the ideal bedrock, and the geographer will find little to quarry. Volume II is a mass of unsifted superficial deposits which are far too common in modern topographical writing. The conglomerate is composed of history, religion, language and literature. It includes an enthusiastic chapter on the National Eisteddfod. Druids are earnestly defended and make many appearances, but not, curiously, at Stonehenge, possibly because this is "a gigantic earthwork on a scientific military plan." Three of the better chapters (on soldiers, food and railways) spill into Volume II. The author's style produces some spectacular scenic effects, notably "the tall chimneys of Loughor and Llanelly, across the sands, dressed in bonnets, flannel dresses and shawls." These unlucky chimneys are set in a frothing torrent of words which cascades past 13 commas. A foaming torrent style may be suited to a rugged land, but Welsh rivers have mature sections.

Topographical writing can be firmly based. A distinguished geologist has published a monograph on the magnificent river scenery of the upper Neath valley. "There are 13 waterfalls and half a hundred rocks within three miles" is neither a complete nor a lucid description of an area which attracts increasing numbers of intelligent pedestrians. Most of Miss Frazer's routes are by rail and road and these networks are sadly incomplete in rural Wales. Topography does not consist in scattering placenames abundantly and with abandon: some do not bear out the introductory note on correct Welsh spellings. The topographer need not consistently substitute legend for fact. Contemporaries tell us that the fiasco of the French invasion was witnessed by many "poor women with red flannel over their shoulders. There is no evidence that Lord Cawdor enlisted them in force to run up and around the slopes of Fishguard Bay. They probably gathered to gossip. Some "facts" are given with misleading precision. For example: "the enclosures had begun in 1733": "it is a historical fact that the low-lying lands of Cardigan Bay were overwhelmed by the sea about 520 A.D." The first date is too late by a few centuries and the second by a few millenia.

Remarkable industrial changes have occurred in Wales in the past decade. We cannot expect them to be described in a series like the County Books, but we are entitled to accuracy when such important factors are mentioned. Trading estates are not limited to South Wales and how can one correlate "the largest sheet and tinplate works in the world at Port Talbot" on p. 112 with "the parlous condition of trade at Port Talbot" on p. 113? The port of Swansea is much more flourishing than Miss Frazer suggests. And what is meant by "A Welsh peasant farmer can make a living where even a good Scotsman might be discouraged"? This may be true of bulk milk retailing in London, but it is otherwise not proven. The peasantries of Wales and Scotland have wrought and thought mightily under grim conditions, but let their fields of battle be Murrayfields.

From Llandaff cathedral, "an irreparable loss" to the "vast natural harbour" of Pwllheli, *Wales* is strewn with mis-statements. Biological misconceptions include congers in Kenfig Pool, kites in Tregaron Bog and *Lloydia* as a plant of Bangor's "hills and quarries." Hybrids like *sants* and *heolskitchi* should have no hope of posterity, and is *Glamorganshire* really necessary? The volumes have some good features. One is that peasant poets are frequently mentioned in their village settings and another is the inclusion of homely details from sources which are not readily accessible to the general reader. The photographs are often excellent, but why could they not have been grouped in some slight regional relationship to the text?

M.D.

The Face of Ulster. The Face of Britain Series. Denis O'D. Hanna. $14 \cdot 5 \times 22$ cm. viii + 136 pp. London. B. T. Batsford, Ltd. 1952. 15/–.

In this new book on the former northern province of Ireland Mr. Hanna has given a superficial picture of Ulster. The book begins with three general chapters touching upon historical, physical and architectural conditions affecting the province, chapters which unfortunately contain many inaccuracies and misleading statements. There follow seven chapters in which places of interest to the general public or to the tourist, in the counties of Ulster, are briefly mentioned. The result is an elaborate guide book in which picturesque but often unscientific descriptions of scenery and buildings, with historical details and anecdotes, are interspersed with personal opinions and reflections. Mr. Hanna claims in his preface that he has tried to capture the regional spirit of Ulster, yet he hardly mentions the people who inhabit the land. No one, reading this book, will get a coherent picture of Ulster. In view of the shortage of books on Ireland it is most regrettable that this one does not achieve the standard of other Batsford volumes. J.M.G.

A Geography of Europe. Jean Gottmann. 16×24 cm. x + 699 pp. London. Harrap & Co., Ltd. 1952. 30/–.

Jean Gottmann is one of the younger French geographers who studied under Demangeon, and who has in a relatively short time built up a considerable reputation on both sides of the Atlantic. In this book, first written as a college text for American students and now re-issued by a British publisher, he does not maintain the standards of accuracy which might have been expected of one who claims to write (in the words of the preface) " with the insight of the native and some of the objectivity of the outsider." The plan of the book is regional, and original. Apart from three introductory chapters, Europe is treated in four major divisions : Western Europe (including Scandinavia and Switzerland), Central Europe (including Finland and Rumania), Mediterranean Europe, and the Soviet Union. This is sufficient token of the author's lively interest in the impact of recent political changes on the already complex geography of Europe. On this subject he writes confidently, though the reader's confidence in the author will be weakened by a too evident compromise between scholarship and popularity. A laudable wish to avoid technical terminology can hardly account for references to the work of quaternary ice-sheets as "particularly appalling," nor the statements that the erosive power of the Alpine ice-cap was " such that it literally carried mountains away ; before the glaciations the mountains were probably twice as high as afterwards," or that ice created " hills south-east of the Baltic as much as 2,500 feet in height " (p. 20). One wonders, too, what to make of the following : " climate is largely a matter of contrasts, weather of instability : even in the moderate, maritime Europe such contrasts and such instability are frequent " (p. 24). It must indeed be said that treatment of the physical background is superficial and misleading throughout. In the chapter on the British Isles, for example, the Weald is dismissed as " quaint topography," while on the south coast " here and there the cliffs break into wide-open chasms, in which are ports " (p. 205). Similarly it is difficult to reconcile the " deep, rich, glacial drift " of coastal Wales (p. 206) with the statement on p. 22 that " boulder-clay (drift, or clayish, thinly-ground rocks) . . . provides rather poor, damp soil."

The explanations of cultural elements of the landscape are also sometimes most misleading. On p. 192 the innocent reader will gain the impression that Celtic fields covered the English plain and are still generally visible in air photographs, and, on p. 197, that Bessemer invented the open-hearth process in 1853 ! In the chapter on Italy "a tremendous olive-grove follows the coast from Brindisi to Bari (p. 526), the vine is omitted from crops of the Neapolitan plain and, curiously, France and Italy " are to a large extent complementary " (p. 531). There are many such examples of exaggeration and loose expression.

If one can overlook the inevitable errors in a work of this scope and the frequently injudicious language exemplified above, there is much to interest the reader who is anxious to place recent political movements and events in their geographical perspective. Most of the maps are drawn from un-named authors in the *Geographical Review*, and have not hitherto been conveniently collected in one volume. The best feature of the book is the lavish illustration, excellent

photographs appearing on nearly every other page. It is unfortunate that many of them lack both title and explanation, and some are inappropriate, but these are minor faults. The wealth of illustration makes the book most attractive, and, in view of the deficiencies of the text, one might say dangerously attractive for immature students. It is to be hoped that teachers will not be tempted to use it as a textbook for sixth-form teaching. On the other hand, those who are already equipped to read with discrimination may find it stimulating, and a book which could, with extensive and careful revision, form a valuable complement to Margaret Shackleton's sound and scholarly work. A.J.H.

The Peoples of South Africa. State Information Office. 23 × 29 cm. 73 pp. Pretoria State Information Office. 1952.

South Africa's Heritage. State Information Office. 21·5 × 27·5 cm. 60 pp. Pretoria State Information Office. 1952.

These two brochures, excellently produced and printed, are among the considerable material being issued by the State Information Office of the Union of South Africa to help the world to understand South Africa's problems.

The first, by means of brilliant and carefully chosen photographs, with short accompanying texts and distribution maps, shows the wide variety of racial and cultural human types within the Union's boundaries. Unfortunately, the effects of modern life upon these primitive peoples, for example, detribalisation, urbanisation, and malnutrition, are inadequately treated and the reader thus comes no nearer to an understanding of the background of present political unrest.

The second brochure commemorates the tercentenary of the Dutch settlement of the Cape, and in so doing presents an historical review of South Africa's cultural and economic progress during the past 300 years. Again, this publication is a valuable aid to teachers, mainly as a source of excellent historical illustrations.

Both are obtainable, free of charge, from the Information Office, South Africa House, Trafalgar Square, London, W.C.2. D.L.N.

American Agriculture. Its Background and Its Lessons. Ministry of Agriculture and Fisheries. 15 × 24 cm. iv + 78 pp. London. H.M.S.O. 1952. 2/6.

This book represents a comparison of the agriculture of the U.S.A. with that of Great Britain, written by a former agricultural attaché in Washington. As such, the geographer may at times find the comment too technical to appreciate, but the author's experience of American farm life is obviously wide. The emphasis being throughout upon comparison results he is drawn into invidious, and sometimes questionable, generalisations (e.g. the climate of the United States is also less reliable than ours). At the same time, the method has the advantage of depicting the real circumstances prevailing on American farms rather than the mere paraphernalia of agricultural organisation. On the whole, the author's conclusions regarding relative efficiency will encourage, and perhaps flatter, British farmers. J.H.P.

British Columbia. F. Goodchild. 14 × 22 cm. 216 pp. London. Allen & Unwin, Ltd. 1951. 18/-.

This is an attempt to give a comprehensive picture of British Columbia and to guide the reader to more detailed information, should he desire it; the author hopes to entice the reader to a further study of Canada's magnificent mountain province. Unhappily, execution has fallen short of conception, and it is doubtful whether readers will report a quickening of interest through reading this encyclopædic little volume. The chapter on "Geography, Climate, and Geology" epitomises the method of the book; we are told the number of peaks above 10,000 feet (246), and how many rivers flow southwestwards to the Pacific (90 apparently), but by p. 216 one wearies of the catalogue. Alexander Mackenzie is described as a man of "empirical vision," and that is not the only solecism.

However, the book will prove useful to all who wish to know "the facts" of British Columbia, so far as they can be expressed statistically. Nothing seems to have been overlooked, and the book is a mine of information. There is an attractive map. A.MacP.

Brazil: An Interim Assessment. J. A. Camacho. 14 × 21 cm. viii + 116 pp. London. Royal Institute of International Affairs. 1952. 11/6.

This brief account of a very large country is more than a concise factual survey. The author is convinced that Brazil, both past and present, can make important contributions to the understanding of many world problems. Miscegenation, for example, appears here as the only satisfactory solution to racial problems. Such ideas make for interesting reading. Geographic aspects receive scant attention as may be judged by the naïve dismissal of "geographical features" in less than six pages. There is of course much information of direct use to geographers elsewhere in the book which is both a valuable introduction to Brazil and a lively summary of the conditions and events to which may be attributed Brazil's rising status in the field of international relations.

A.J.H.

The Amazing Amazon. Willard Price. 14·5 × 22 cm. 220 pp London. William Heinemann, Ltd. 1952. 18/–

This book is of the same type as William Vogt's *Road to Survival.* Mr. Price has travelled widely in the Amazon Basin and writes with the confidence and vividness of one with first-hand experience to retail. He has also a mission—to arouse public interest in this little known region, and its potential value to mankind. In his anxiety to impress, Mr. Price resorts to extravagant language which often destroys the value of what he has to say—and it is worth saying. It is not for example sufficient for him to say that oil reserves of great potential importance have recently been discovered, but "half the country is floating on it." Many good references are quoted in support of the author's contentions, e.g. a League of Nations estimate that Brazil "could accommodate 900 million people." One would like to know more of ways and means. Again, Grenfell Price is quoted in support of the theory that the Amazonian climate is more suitable to white men than cool climates, but in the author's hands Grenfell Price's careful and non-committal statements become dogmatic assertions. The richness of soils is deduced from the abundance of vegetation, and there are other such examples of specious reasoning. If the reader is prepared, however, to strip the mantle of exaggeration from the interesting body of observed facts and statistics presented, this book can serve a useful purpose in drawing attention to recent developments and projects in Brazil which may not appear in more scholarly works for many years. A.J.H.

The Use of Geography. "Teach Yourself Geography" Series. F. Debenham. 12·75 × 19·4 cm. x + 206 pp. London. English Universities Press, Ltd. 1950. 6/–.

Professor Debenham approaches his task of writing a key volume to this series with an infectious enthusiasm for his subject and a youthful curiosity that years of teaching and travel have done nothing to dim. Whether he is deploring the inarticulateness of the mariners of the first millennium and the formal uninformativeness of the contemporary Jerusalem maps; voyaging in an atlas, an armchair and his imagination; making a sundial or using the globes; exploring the countryside with map and bicycle; seeking warm spots in his garden for the earlies; giving a commentary on geographers at work or urging young men and women to have a go at travel and adventure, he is always leading us on to teach ourselves something about the subject that he loves and lives. Even qualified geographers who read him will put the book down with a renewed pride in their subject and with a feeling of having learnt something that they did not know before. A.A.M.

Physical Geography. "Teach Yourself Geography" Series. R. F. Peel. 12·75 × 19 cm. vii + 290 pp. London. English Universities Press. 1952. 10/6.

On the dust cover this book is claimed as "Modern, Authoritative, Succinct and entirely Comprehensible." One readily admits the first three claims, but not perhaps the last. For into 277 pages have been compressed the elements of Physical Geology, Meteorology, Climatology, Hydrology, Oceanography and even some reference to soils. The book is very readable, but technical terms,

such as the names of geological systems, are too often introduced without sufficient explanation. The full benefit of the book and especially of the last excellent chapter on Physical Geography and Human affairs (soil conservation, flood control, water supply, etc.) will only be gained by those who already have a knowledge of the topics covered. They will find Professor Peel's viewpoint and treatment both instructive and thought provoking. J.F.K.

Maps and Diagrams. F. J. Monkhouse and H. R. Wilkinson. 14 × 22 cm. xvi + 330 pp. London. Methuen & Co., Ltd. 1952. 25/–.

This is an excellent book. Its comprehensiveness and skill of presentation make it the outstanding textbook on cartographical methods so far published in the English language and it should become a standard work of reference wherever English is understood. Although written primarily for the advanced student of geography, it contains much information of value to all who use or make maps and diagrams. Historians and workers in the political and social sciences should consult it, so that they may appreciate more readily the value and limitations of the cartographer's technique in the advancement of their studies. The expression "maps and diagrams" has been interpreted in the widest sense, since "geographical data lend themselves to many possibilities and varieties of cartographical and diagrammatic treatment."

The book, which follows closely the course in cartographical methods given in several British University Departments of Geography, comprises six chapters: I, Materials and Techniques; II, Relief Maps and Diagrams; III, Climatic Maps and Diagrams; IV, Economic Maps and Diagrams; V, Population Maps and Diagrams; VI, Maps and diagrams of settlements. Numerous footnote references are made to articles in British and foreign periodicals which discuss the many cartographical methods considered, or make effective use of them. It is to be regretted that no separate bibliography is included. The book is finely illustrated with some 208 maps and diagrams specially drawn to illustrate the techniques and methods described in this excellent exposition. E.M.J.C.

The Look of Maps. A. H. Robinson. 16 × 24·5 cm. ix + 105 pp. Madison. University of Wisconsin Press, Ltd. 1952. $2.75c.

The Look of Maps. An Examination of Cartographic Design is a collection of ten essays originally prepared by the author as a dissertation for the degree of Ph.D. awarded by the Ohio State University. It has all the merits and all the defects of dissertations prepared by students for higher degrees in geography. The author doubtless benefitted from his study of cartographic design during "two entire summers" but he did not manage to write a readable text during the third summer devoted to his project. The work has neither introduction nor conclusion and one is forced to the opinion that in the years to come, the author will wish that he had considerably streamlined the text of his *primum opus*. The most useful part of the book to the European student of cartographical methods is the selected bibliography. E.M.J.C.

An Introduction to Mapwork and Practical Geography. J. Bygott. 16·5 × 21 cm. viii + 249 pp. London. The University Tutorial Press, Ltd. 1952. 14/6.

It is now nearly twenty years since the first edition of this comprehensive textbook on the elements of cartography and map interpretation was published. Its value has not diminished with the passage of time, mainly because the author has realised the importance of trying to keep the text and illustrations up to date. In the fourth edition (now reviewed), the Ordnance Survey one-inch map excerpts are from the New Popular (Sixth) edition and a portion of a sheet of the Ordnance Survey 1 : 25,000 Map is included for the first time. The other alterations are of a minor nature and the author has tried to retain, as far as possible, the diagram numbers and pagination of earlier editions. The book was originally designed to provide an introductory course in map reading and practical geography suitable for use in the upper forms of schools and first year University classes. This it still tries to do and without doubt it remains the most comprehensive single English work available for students preparing to offer geography at the Advanced and Scholarship levels of the G.C.E.; first year University students are now expected to pursue their studies to a more advanced level. E.M.J.C.

Maps and Map-Makers. R. V. Tooley. 18·5 × 25·5 cm. xii + 140 pp. London. B. T. Batsford, Ltd. 1952. 42/–.

It is very satisfactory that this book has gone into a second edition. That in itself is not necessarily proof that a book is properly appreciated, but in this case there can be no doubt. The illustration and references by themselves are of first rate value, and the author has written a useful text—although it must be admitted that it is rather in the nature of a catalogue with comments. This, however, is inevitable if the book is to be kept within reasonable limits. Messrs. Batsford have given the book an excellent format and its whole appearance is good.

Geographers will find it useful in many ways. It gives a good summary of the history of maps and their makers, and the student, of whatever standing he may be, will find the well-produced plates and numerous lists of maps of countries, or counties, or special subjects, most helpful in his work. Doubtless the volume is already in all geographical libraries—it certainly ought to be! The price is not by any means too high in view of the number of plates, several of which are coloured. One can but regret that present-day conditions make a two-guinea book on a somewhat specialised, but extremely interesting, subject an almost impossible possession for the undergraduate.

J.A.S.

Human Geography. J. Brunhes. 19 × 25·5 cm. 256 pp. London. G. Harrap & Co., Ltd. 1952. 25/–.

The American translation of Brunhes' classic, sponsored by Isaiah Bowman, being out of print, this new translation of the abridged French version published by Jean Brunhes-Delamarre and Pierre Deffontaines in 1947 will be doubly welcome. It has been done by Ernest Row, and is in everything except size an improvement on the earlier translation. In the abridged edition chapters vii and ix, dealing with conditions in the central Andes and with highways in south-east Asia, are omitted, but many passages are new, being either taken from other writings of Brunhes or added to bring sections up-to-date, or at least to 1939. The most valuable additions, however, are in the illustrations, which include 26 new maps and 47 new photographs. The latter are grouped at the end of the volume and make a valuable corpus of illustrations of house types, settlement patterns, communications and other elements of human geography.

In other ways the abridgement remains faithful to the original, retaining "the true spirit of Human Geography and its character as a fundamental work of scientific method and investigation." The familiar chapter headings are unchanged: the essential facts (unproductive occupation, cultivation and stock-raising, destructive exploitation); the special studies; and facts outside the essential group (regional geography and ethnography, social geography, geography of history) and the geographic spirit. This work remains the most satisfying analysis of the subject that has yet been written, and the new translation deserves to be widely known.

E.E.E.

World Resources and Industries. (Revised edition). Erich W. Zimmermann. 18·5 × 27 cm. xvi + 832 pp. New York. Harper Bros. 1952. $7.50c.

The revised edition of this well-known work is certainly one of the few important books which concern themselves, for the world as a whole, with the borderland between geography and economics. It is a considerable improvement on the earlier edition (1933); the text has been completely revised and largely rewritten; the statistical tables have been extended to 1947, and the number of illustrations has been increased and now includes four excellent photographic sections.

The approach adopted is systematic. For each resource discussed, geographical, historical, economic and technological aspects are examined. The geographical aspect is outlined more fully in this revised edition than in the earlier edition, but to geographers this book must be of greatest interest and use in its presentation of much relevant economic and technological data. It cannot fail to be of great value to the economic geographer.

E.M.R.

Geographical Articles in Magazines Received

CONTINUED FROM VOL. XXXVII, pp. 188 to 190.

Journals listed here may be borrowed from the Library by members of the Association. References are listed according to the classification published in the *Annals of the Association of American Geographers*, Vol. XXVII, June, 1937.

A of G—Annals of the Association of American Geographers. A of Sc.—The Advancement of Science. BGB—Bulletin de la Société de Géographie de Beograd. CGR—Geographical Review of India (formerly Calcutta Geogr. Review). EG—Economic Geography. GA—Geografiska Annaler. GJ—Geographical Journal. GR—Geographical Review. GSI—Geographical Society of Ireland. GV—Geografiski Vestnik. J of G—Journal of Geography. MO—Marine Observer. N—Nada. NG—New Zealand Geographer. PGA—Proceedings of the Geologists' Association. PGR—Pakistan Geographical Review. RBG—Revista Brasiliera de Geografia. RGA—Révue de Géographie Alpine. RGI—Rivista Geografica Italiana. SGM—Scottish Geographical Magazine. SR—Sociological Review. T—Terra. UE—United Empire.

(E)—English Summary. (F)—French Summary. *—Map.

TEACHING. N. AHMAD, PGR, No. 1, '52.—Value of geographical training and careers for geographers in Pakistan. T. F. BARTON, J of G, Jan. '52.—Collecting and visualising precipitation data in schools. H. F. BECKER, J of G, Mar. '52.—Implications of resource-use education for geographers. W. H. BECKMAN, J of G, Mar. '52.—Trees to lumber: a project. G. R. BOLGE, J of G, Sept. '52.—Flannel maps—activity in fifth grade geography. I. BROCKMYER, J of G, Oct. '52.—Ceylon versus the curriculum. W. CALEF, J of G, Mar. '52.—Geographic contributions to conservation education. E. COLESON, J of G, Apr. '52.—Teaching locational geography on the elementary level. COMMITTEE ON STANDARDS OF CERTIFICATION, J of G, Apr. '52.—Survey of the academic and professional preparation of the critic or supervisor of student teaching in the field of geography. L. B. JAMES, J of G, Apr. '52.—*Daily Graphic News:* A pupil newspaper. L. B. JAMES, J of G, Sept. '52.—Mystery Country—a lesson in the reading of graphs and statistics. G. H. KING, J of G, Oct. '52.—The teaching of local geography in the fifth grade. D. M. MATHUR, J of G, Sept. '52.—Construction of a simple model for teaching interpretation of contour lines. J. E. Van RIPER, J of G, Oct. '52.—Teaching of college physical geography. R. W. TRAIL, J of G, Sept. '52.—Maps in the primary grades. H. H. VISHER, J of G, Mar. '52.—Conservation education thru Social Studies. P. P. VOURAS, J of G, Mar. '52.—Location of schools—problem in education geography. L. WHEELER, J of G, Oct. '52.—Teaching third grade geography. K. J. WILLIAMS, J of G, Apr. '52.—Survey of the knowledge of incoming students in college geography. M. C. WILSON, J of G, Feb. '52.—Junior High School geography.

BRITISH COMMONWEALTH. R. O. BUCHANAN, A of Sc, Sept. '52.—Settlement in the overseas Dominions. R. LEWIS, UE, Sept. '52.—Manpower requirements of the Dominions. H. PAGET, UE, Sept. '52.—Mixed societies in the Dominions and Colonies.

EUROPE. I. AARIO, T, No. 2, '52.—Helsinki as a large city. (E). R. ALBERTINI, RGI, July '52.—Geomorphology in the Berici Hills, Vicenza. (E) M. ALLEFRESDE, RGA, Pt. IV, '52.—Fabrications fromagères en Haute-Savoie. M. T. BARET, RGA, Pt. III, '52.—L'élevage des bovins et le lait en Bas-Dauphine. R. BIASUTTI, RGI, July '52.—Bibliography (regional); rural settlement in Italy. F. BOURDIER, RGA, Pt. III, '52.—Morphologie et pédologie—la Bievre-Valloire. S. BRODAR, GV, '52.—Stratigraphy of karst caves of the basin of Pivka. (E.) J. DELASPRE, RGA, Pt. III, '52.—Naissance d'un paysage rural au 18° siècle sur les hauts plateaux—le Cantal et la Margeride. M. DERRUAU, RGA, Pt. 1, '52.—"Village tombeau" dans le Bas-Languedoc: Capestang (Herault). L. GACHON, RGA, Pt. 2, '52.—Récentes déprises et reprises humaines sur les massifs anciens du centre de la France. A. A. GRIGORYEV, GJ, Jne. '52.—Soviet plans for irrigation and power: geographical assessment. P. GUICHONNET, RGA, Pt. 2. '52.—Projet de tunnel routier sous le Mont-Blanc. L. E. HAMELIN, RGA, Pt. IV. '52.—Position structurale du Bas Dauphine. W. B. HARLAND, GJ, Sept. '52.—Cambridge Spitsbergen Expedition, 1949. C. D. HARRIS, GR, Oct. '52.—Geographical literature on the Soviet Union—a discussion.* N. R. HEIDEN.

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